ORICA

CLIMATE ACTION REPORT 2022

Reporting suite

The FY2022 Climate Action Report forms part of our corporate reporting suite for the 2022 financial year, which is available at **orica.com/investors**

FY2022 ANNUAL REPORT

Presents a holistic view of our activities, financial and non-financial performance, and strategies in FY2022.

FY2022 CORPORATE GOVERNANCE STATEMENT

In accordance with the ASX Council's Corporate Governance Principles and Recommendations (4th Edition).

FY2022 MODERN SLAVERY STATEMENT

In accordance with the *Australian Modern Slavery Act 2018* (Cth) and the UK Modern Slavery Act 2015.

FY2022 TAX TRANSPARENCY REPORT

Overview of our approach to tax, governance structure and tax position.

CONTENTS

The following documents are available at orica.com/Investors

- Full Year Results Investor Presentation
- Full Year Results ASX Announcement
- Appendix 4E

An ESG Data Centre will be available on our website by the end of November 2022 and includes a TCFD index and Climate Action 100+ index.

About this report

This report aligns to the Task Force on Climate-related Financial Disclosures (TCFD) voluntary disclosure framework.

It outlines Orica's approach to climate change including our governance processes, strategy, risk management, metrics and targets to manage climate risk and realise climate-related opportunities. It also outlines our decarbonisation and transition planning.

Monetary amounts are subject to rounding and are reported in Australian dollars (AUD) unless otherwise stated.

Enquiries about this report or our annual reporting suite can be directed to companyinfo@orica.com.

This report includes forward-looking information regarding the plans, strategies, objectives and ambitions of Orica Limited and its relevant controlled entities (Orica) within its greenhouse gas (GHG) emissions boundary and in relation to responding to climate change. It is provided for informational purposes only and has not been prepared to provide any guidance in relation to the future performance of Orica, including its performance in relation to GHG emissions reduction and responding to climate change generally.

The forward-looking information in this report is based on management's current expectations and reflects judgements, assumptions, estimates and other information available as at the date of this document. While these forward-looking statements reflect Orica's expectations at the date of this report, they are not guarantees or predictions of future performance or outcomes. They involve known and unknown risks and uncertainties, which may cause actual outcomes and developments to differ materially from those expressed in the statements contained in this report.

There are also limitations with respect to the scenario analysis which is discussed in this report, 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.

Orica cautions readers against reliance on any forward-looking statements or guidance, particularly in light of the long-time horizon which this report discusses and the inherent uncertainty in policy, market and technological developments in the future. Orica will not be liable for the correctness and/or accuracy of the information, nor any differences between the information provided and actual outcomes and reserves the right to change its projections from time to time. Except as required by applicable regulations or by law, Orica does not undertake any obligation to publicly update or review any forward-looking statements.

GHG EMISSIONS INVENTORY AND BOUNDARY

Several metrics are used to measure our GHG emissions and impact, which we disclose publicly to investors and other stakeholders through our Annual Report, Climate Action Report, ESG Data Centre and by responding annually to CDP's Climate Change Questionnaire. We also report energy and GHG emissions as required by law in relevant jurisdictions where we operate.

Our GHG emissions inventory has been prepared with reference to the World Resources Institute and the World Business Council for Sustainable Development GHG Protocol 'Corporate Accounting and Reporting Standard' and 'Corporate Value Chain (Scope 3) Accounting and Reporting Standard'. The Australian Government's *National Greenhouse and Energy Reporting Act 2007*, supporting regulations and relevant guidelines are applied.

This report and our GHG emissions inventory boundary cover Orica operations worldwide over which, unless otherwise stated, we have operational control for the financial year ending 30 September 2022. Operational control means facilities where Orica has the overall authority to introduce and implement operating policies, health and safety policies, and environmental policies. Alternative GHG emissions consolidation approaches, including equity share or financial control, is not reported.

ASSURANCE

Ernst & Young (EY) have independently assured our GHG data and performance metrics. The Assurance Statement is available online at our ESG Data Centre.

OUR APPROACH TO CLIMATE CHANGE

At Orica, we continually challenge ourselves to be better. This includes being responsible stewards of the environment and taking action to address climate change.

Our approach to climate change is built on four focus areas: capturing new opportunity; enhancing resilience; catalysing action; and reducing emissions. Each year, we report on our progress including against goals and targets we set ourselves.

By taking advantage of the opportunities we have, Orica can create a more prosperous future for our business and society. More materials, metals and minerals will be required to help the global economy grow and transition to net zero emissions. Our priority is to sustainably mobilise the earth's resources and help our customers meet their goals.

Climate change is a material risk for our business. The chemical manufacture and use of commercial explosives in mining and civil blasting is energy-intensive and releases greenhouse gas emissions. Assets are long-lived and change takes time.

Some chemical processes are hard-to-abate with alternative lower-emissions technologies only just emerging. Transition planning and operational decarbonisation are therefore embedded in our core business strategy.

The business faces long-term shifts in commodity demand and customer mix as the world transitions towards a net zero emissions economy. By collaborating with our customers and other stakeholders, we are helping find solutions to our industry's biggest challenges so we can move towards a lower carbon future, together.

To read more about our company, please visit www.orica.com/about-us.

"Our approach to climate change is built on four focus areas: capturing new opportunity, enhancing resilience, catalysing action and reducing emissions. Each year, we report on our progress including against goals and targets we set ourselves."

PROGRESS IN REVIEW

Pre FY2020

FY2019 → Adopted the recommendations of the Task Force on Climate-related Financial Disclosures

FY2017 → Reported material Scope 3 emissions categories

→ Climate Change Policy published

FY2016 → Mineral Carbonation International (MCi) pilot plant commissioned

FY2013 → Invested in start-up MCi

FY2008–FY2012 → Installed secondary nitrous oxide abatement across global nitric acid plants

FY2020

SET TARGET TO REDUCE OPERATIONAL SCOPE 1 & SCOPE 2 EMISSIONS BY AT LEAST

40%

BY FY2030
on FY2019 levels

→ Developed evidence-based decarbonisation pathway

→ Sanctioned Carseland tertiary abatement

→ Refreshed Climate Change Policy

FY2021

SET AMBITION FOR

Net zero emissions

BY 2050[1]

→ Installed tertiary abatement at Carseland manufacturing facility

→ Announced $37m Kooragang Island Decarbonisation Project

→ Published inaugural Climate Action Report

→ Expanded Scope 3 GHG emissions inventory

→ Linked executive remuneration to GHG emissions reduction

→ Launched Cyclo™ to reuse oil for explosives, reducing fuel and diesel consumption

FY2022 Year in review

SET TARGET TO SOURCE

100% renewable electricity

BY 2040

with interim step of 60 per cent by 2030[1]

Reduced net Scope 1 and 2 GHG emissions by 14 per cent since FY2019 base year[2]

Signed 10-year renewable Power Purchase Agreement with Lightsource bp at Wellington North Solar Farm in Australia

Tertiary abatement installation commenced at Kooragang Island

Green hydrogen and green ammonia partnerships with Origin Energy (Newcastle) and H2U Group (Gladstone)

Converted $1.3B of existing bank lending facilities to Sustainability Linked Loans

Concept studies for specialised mobile fleet electrification completed

FY2023+

→ Complete installation of tertiary abatement at Kooragang Island

→ Support construction of MCi demonstration plant

→ Develop value chain decarbonisation strategy

→ Progress green hydrogen partnerships

→ Carbon market and offset strategy

→ Expand strategic partnerships in future-facing industries

(1) Our net zero emissions ambition covers our global Scope 1 and 2 emissions under our direct control, and material Scope 3 emission sources. Material means the GHG emissions embodied in purchased ammonia and ammonium nitrate included in the Scope 3 reporting category of purchased goods and services. These comprise around two-thirds of Orica's Scope 3 emissions footprint. Achieving this ambition will require effective government policy frameworks, supportive regulation and financial incentives, and access to new low-carbon technologies operating at commercial scale.

(1) The renewable electricity target boundary excludes small sites (e.g. single remote offices, depots, etc), markets where total consumption is less than 100 MWh/pa, or countries where credible sourcing options do not exist. This approach is consistent with industry standards.

(2) Includes the surrender of 60,000 Australian Carbon Credit Units to proactively maintain our net emissions below a regulatory emissions limit. Further information is available on page 34.

A MESSAGE FROM OUR MANAGING DIRECTOR AND CEO

Welcome to Orica's Climate Action Report 2022, aligned with the recommendations of the Task Force on Climate-related Financial Disclosures (TCFD). We outline how we manage and integrate climate-related risks and opportunities into our business and strategic planning.

Sanjeev Gandhi
Managing Director and Chief Executive Officer

Orica's financial and operational success is underpinned by effective sustainability and climate change practices. This Climate Action Report outlines how we managed the climate-related risks and opportunities associated with our strategic priorities throughout FY2022 – a year in which we increased revenue to $7.1 billion and total underlying EBIT to $579 million. Our financial performance and growth improved despite facing several challenges and opportunities that tested our capabilities including geopolitical tensions, trade sanctions, strong global commodity prices, and security of supply risks.

I am pleased with our progress and climate change performance. Over the financial year ending September 2022, our sustenance capital included $21 million towards reducing emissions.

Key highlights detailed in this report include:

- net GHG emissions totalled 14 per cent below FY2019 baseline levels, continuing our trajectory to reduce Scope 1 and 2 GHG emissions by at least 40 per cent by 2030;
- tertiary catalyst abatement reducing nitrous oxide emissions by 95 per cent from unabated levels at Carseland, Canada;
- installation of tertiary catalyst abatement technology is underway at Kooragang Island, Australia;
- diversifying our commodity exposure and rebalancing our portfolio towards higher growth commodities, including future-facing resources;
- signing a 10-year renewable power purchase agreement to help mitigate rising energy prices and progress towards achieving our target to source 100 per cent renewable electricity by 2040;
- offering products that give rise to recycled and circular solutions such as Cyclo™ to help our customers lower their environmental footprint; and
- demonstration scale mineral carbonation plant underway at Kooragang Island with our joint venture partner Mineral Carbonation International (MCi).

It was our ability to overcome the disruption in global commodity markets and dislocated supply chains that best demonstrated how our people, stakeholder relationships, supply chain and manufacturing resilience combined to achieve positive outcomes.

It took a concerted effort by our whole workforce to continue to meet customer demand and maintain security of product supply across our operations.

A MESSAGE FROM OUR MANAGING DIRECTOR AND CEO

The Russia-Ukraine conflict created further disruption to ammonium nitrate and energy markets and constrained ammonium nitrate trade flows for our Latin America and African customers. In response, our teams increased manufacturing output and established alternative sourcing initiatives. Consequently, this year indirect Scope 3 emissions from purchased ammonium nitrate were displaced into manufactured Scope 1 and Scope 2 emissions. This was most evident at our Yarwun manufacturing centre, which is forecast to exceed its regulated emissions limit, requiring the surrender of 60,000 Australian Carbon Credit Units to meet compliance.

Looking ahead, I'm confident our exposure to carbon regulation and costs will be mitigated through our action to establish industrial carbon credit generation projects such as the Kooragang Island Decarbonisation Project.

Elevated commodity prices this year drove increased demand for our products and services. Copper became our highest commodity revenue exposure and thermal coal fell now representing 16 per cent of total revenue. Together with growth in future-facing commodities, digital solutions, technology offerings and new initiatives including green hydrogen and green ammonia partnerships, we continue along a pathway to diversify our business and mitigate climate-related transition risks.

Conversely, with cost inflation, tight labour markets and supply chain dislocation, the challenge of decarbonising heavy industry has been made more difficult.

Commodities including steel, copper and other metals are becoming more expensive but are vital for the manufacture of low-emissions technologies such as solar panels and wind turbines.

Rain events and flooding in Australia caused impacts to our customers surface operations. Our resilience and value was demonstrated with customers transitioning to premium products, offsetting suppressed volumes from the wet weather.

None of these developments is a reason to delay action. We strongly believe that accelerating our decarbonisation journey puts Orica at a competitive advantage and will lead to better outcomes for our business, stakeholders, and society.

The future is full of exciting opportunities for Orica. As the markets we operate in move towards a lower-carbon economy, we are capturing new opportunities in the renewable energy sector and growing in future-facing commodities. We are also well placed to leverage our existing manufacturing capabilities, strategic port access and infrastructure to play an important role in emerging green hydrogen and green ammonia value chains.

Finally, I want to thank our people for their enthusiasm, dedication, and hard work to advance our action on climate change to date. We have created productive avenues to play a role in addressing climate change. Not only are we making Orica more competitive, but we are taking tangible action to reduce greenhouse gas emissions, helping bring positive impact to communities all around the world.

Sanjeev Gandhi
Managing Director and
Chief Executive Officer

STRATEGY AND DECARBONISATION

Climate action remains critical over the next decade and beyond. We believe transitioning to a lower-carbon economy can create value by driving near-term job creation while increasing economic and environmental resilience.

Consistent with our Climate Change Policy, we accept human activities are influencing global warming. We support the global response to keep global temperatures rising to well below 2°C and pursue efforts to constrain warming to 1.5°C. We believe a transition to a net zero emissions economy is required to limit global warming, in line with the goals of the Paris Agreement, and the path to net zero must represent a fair and equitable transition, and encourage sustainable development.

Commodities, raw materials and technology are fundamental to the lower-carbon transition and as the world strives to achieve this, we recognise our business faces long-term shifts in commodity demand and customer mix.

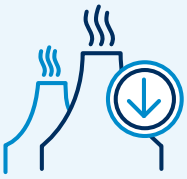
There are several barriers to Orica's progress. Major emissions reduction projects require long-lead times for feasibility, engineering and final investment decision. Installation of new equipment is aligned with scheduled maintenance outages. These occur infrequently every three to five years. The global commodity market and pricing uplift observed in 2022 is increasing the cost of low emissions technology. Some chemical processes are hard-to-abate and new technology options are not cost competitive or only just emerging.

CLIMATE ACTION PILLARS

FUTURE FACING COMMODITIES FOR A LOWER-CARBON ECONOMY

Rebalancing portfolio for a lower-carbon economy

- Maximise opportunities in future-facing commodities
- Play a role in the emerging green hydrogen industry
- Offer lower-carbon AN



ACCELERATE DECARBONISATION

Reduce Orica's GHG emissions in the decade to 2030

- Reduce Scope 1 and 2 emissions by at least 40 per cent by 2030
- Source 100 per cent renewable electricity by 2040
- Ambition to achieve net zero emissions by 2050

EMBED CLIMATE IN OUR STRATEGIC DECISION-MAKING

Integrate consideration of climate change into our governance, risk, strategic and financial planning

- Scenario analysis informs strategic planning
- Executive remuneration linked to emissions reductions
- Expanding adoption of internal carbon pricing

CATALYSE CLIMATE ACTION

Mobilise our people, collaborate and help customers respond to climate change

- Foster climate innovation and technology
- Support emissions reduction in our value chain
- Advocate responsibly on climate

Guiding Principles

A transition to a net zero emissions economy is required to limit global warming in line with the goals of the Paris Agreement[1]

The path to a net zero emissions economy must represent a 'just transition' and encourage sustainable development[2]

Commodities, raw materials and technology are fundamental to a lower-carbon economy

Transparency and disclosure drive individual and collective business performance

(1) Net zero emissions: net zero emissions are achieved when human-induced emissions to the atmosphere are balanced by natural removals over a specified period. The Paris Agreement recognises the need to achieve net zero emissions by the second half of this century.
(2) Ambitious emissions reductions are achieved in conjunction with economic development, adaptation, poverty and reducing social inequity.

STRATEGY AND DECARBONISATION

Although there are challenges, we are committed to playing our part in a global response. Building on our target to reduce our operational emissions by at least 40 per cent by 2030, our ambition is to achieve net zero emissions by 2050[1]. However, success will only come if founded on practical evidence-based initiatives, rapid deployment of mature technologies and access to emerging solutions, and support for incentives to reduce emissions in an economically sustainable manner.

GEOPOLITICS, COMMODITY MARKETS AND CLIMATE CHANGE

The disruption in global energy and commodity markets, inflation and dislocated supply chains has complicated the energy and industrial transition. The global ammonium nitrate (AN) market has not been shielded from these impacts.

Russia enforced quotas on AN exports in December 2021 to guarantee local supplies amid a global supply shortage due to high gas prices. The Russia-Ukraine conflict created further disruption to AN and energy commodity markets. AN trade flows into Latin America and Africa from Russia were constrained. In response, Orica increased manufacturing plant output and put alternative AN sourcing initiatives in place to maintain security of supply for our customers.

AN equivalent sales volumes increased four per cent to 4.3 million tonnes this year from FY2021. The mix of purchased and manufactured AN across our portfolio has changed. As a result, GHG emissions have been displaced from indirect (Scope 3 purchased AN) to operational sources (Scope 1 and 2 manufactured AN). Overall, on a net basis, global Scope 1, 2 and 3 GHG emissions reduced six per cent from the prior year.

While Scope 3 purchased AN emissions reduced this year, operational Scope 1 and 2 GHG emissions increased. This was primarily due to increased plant loading at Yarwun, Australia and Bontang, Indonesia. As a result, Yarwun is reasonably likely to exceed its regulated Scope 1 emissions limit under the Australian Safeguard Mechanism. During the year, Orica negated the forecast excess emissions position by surrendering 60,000 prescribed Australian Carbon Credit Units (ACCU) to reduce the net-emissions of the facility to meet compliance. Further information on managing net emissions and Orica's strategy to manage carbon regulation can be found in the Targets and Performance section.

During the year Orica signed a 10-year Power Purchase Agreement (PPA) in Australia to source renewable electricity from 2025. The PPA will help achieve our renewable electricity goals while providing a hedge against increasingly volatile electricity markets.

Government policies and programs are helping to reduce costs with fiscal subsidies for early-stage low-emissions technology development and deployment. These can take several forms, including tax incentives, grants, loan guarantees, feed-in-tariffs and contracts. Orica continues to partner with government stakeholders around the world to achieve shared policy and decarbonisation objectives.

The challenge of decarbonising heavy industry was made more difficult this year with cost inflation, tight labour markets and supply chain dislocation.

Commodities including steel, copper and other metals are vital for the manufacture of key decarbonising technologies. Wind turbines, solar panels, batteries, and industrial chemical processes are not immune. In the example of tertiary catalyst abatement, Orica has observed significant pricing increases related to stainless steel reactors and precious metal catalysts.

None of these developments is a reason to delay action. We strongly believe that accelerating our decarbonisation pathway puts Orica at a competitive advantage and will lead to better outcomes for our company and society.

DECARBONISATION STRATEGY AND ROADMAP TO 2050

Clear and evidence-based abatement pathways towards achieving our ambition of net zero emissions by 2050 have been identified. Over the medium term, we are focused on optimising our energy use, switching to renewable energy sources, commercialising Carbon Capture Utilisation (CCU) technology and abating chemical process emissions.

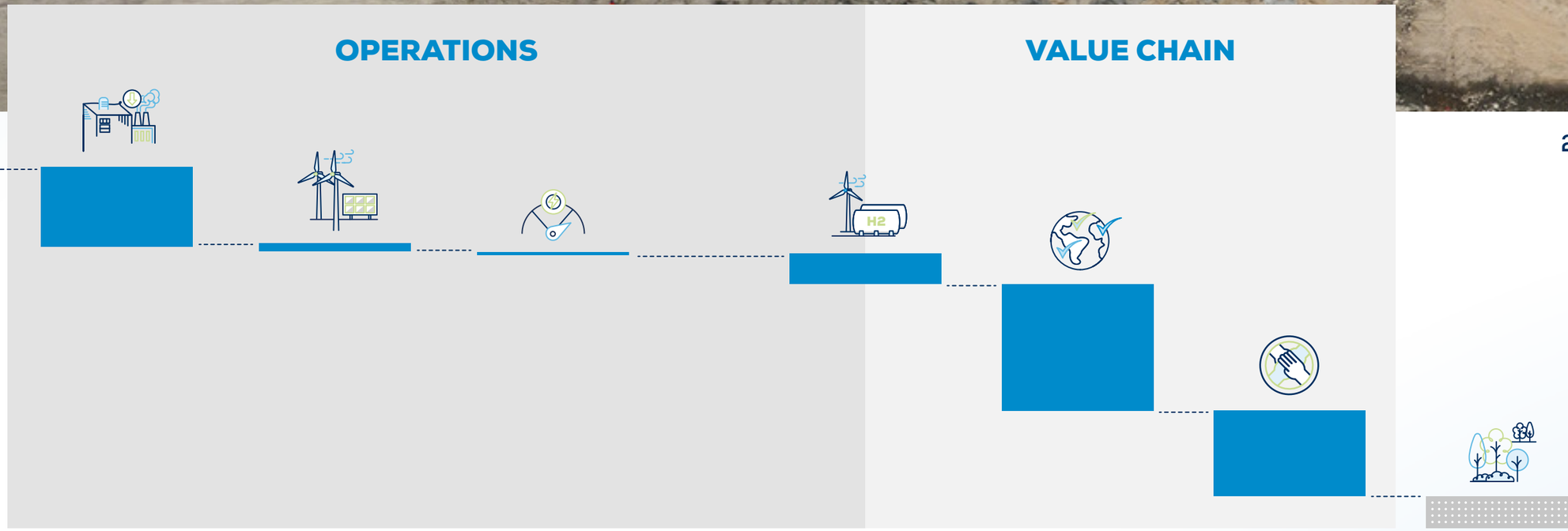
Advancing alternative chemical feedstocks, such as hydrogen produced via electrolysis from renewable sources (i.e. green hydrogen), has commenced. Supply chain emissions accounting, decarbonisation planning, supplier and customer engagement is well underway.

Beyond 2030, the adoption of additional technology levers will be required. These include Carbon Capture Utilisation and Storage (CCUS), fuel switching (e.g. biofuels), electrification and green hydrogen technologies. Achieving net zero emissions will require technology maturity, deployment and commercialisation, and effective and coordinated global climate policies which drive change and provide financial incentives to help fund the cost of the transition.

(1) Our net zero emissions ambition covers our global Scope 1 and 2 emissions under our direct control, and material Scope 3 emission sources. Material means the GHG emissions embodied in purchased ammonia and ammonium nitrate included in the Scope 3 reporting category of purchased goods and services. These comprise around two-thirds of Orica's Scope 3 emissions footprint. Achieving this ambition will require effective government policy frameworks, supportive regulation and financial incentives, and access to new lower-carbon technologies operating at commercial scale.

STRATEGY AND DECARBONISATION

OUR DECARBONISATION PATHWAY



Decarbonisation Levers	Nitrous Oxide Abatement	Renewable Energy	Energy Optimisation	Fuel and Feedstock Switching/CCUS	Lower-Carbon Sourcing	Supplier Engagement	Carbon Offsets
Description	Deploying secondary and tertiary catalyst abatement across nitric acid plants	Sourcing renewable electricity and deploying onsite generation	Driving energy optimisation initiatives	Alternative hydrogen and other feedstocks Carbon capture, utilisation and storage	Sourcing of advanced bio-fuels, and other lower-carbon chemical feedstocks	Engaging with suppliers to collect accurate emissions data and influencing climate initiatives	Avoiding or sequestering GHG emissions from the atmosphere
Key Projects	Secondary abatement ● Bontang ● Carseland (1 plant) ● Yarwun (1 plant) Tertiary abatement ● Carseland (1 plant) ● Kooragang Island ● Yarwun	Offsite generation (e.g. PPAs) ● NSW Australia ● QLD Australia ● Canada Onsite generation ● Gomia, India (solar expansion) ● GroundProbe, QLD Australia	● Energy and waste heat recovery ● Energy efficiency initiatives	● Hunter Valley Hydrogen Hub, NSW Australia ● MCi demonstration plant, NSW Australia ● Specialised mobile fleet electrification	● H2-Hub™ Gladstone, QLD Australia	● Supplier carbon risk and emissions profiling ● Targeted engagements on product-specific emissions intensity and decarbonisation plans Note: Ongoing activities to inform a value chain decarbonisation strategy.	● Carbon market and offset strategy

● Emerging technologies ● Feasibility ● Implementation ● Completed

*^ *Our net zero emissions ambition covers our global Scope 1 and 2 emissions under our direct control, and material Scope 3 emission sources. Material means the GHG emissions embodied in purchased ammonia and ammonium nitrate included in the Scope 3 reporting category of purchased goods and services. These comprise around two-thirds of Orica's Scope 3 emissions footprint. Achieving this ambition will require effective government policy frameworks, supportive regulation and financial incentives, and access to new lower-carbon technologies operating at commercial scale.*

DECARBONISING OPERATIONAL EMISSIONS

Scope 1 abatement

Our four continuous manufacturing facilities produce ammonia, nitric acid, ammonium nitrate and sodium cyanide which together, contribute over 97 per cent of our Scope 1 emissions. Our priority is to mitigate nitrous oxide GHG emissions from nitric acid production across our nine global Nitric Acid Plants (NAPs). This relies on optimising existing secondary catalyst abatement technology and deploying best-available tertiary abatement.

This year, we commissioned tertiary abatement catalyst at one of our two NAPs at the Carseland facility in Canada. We also took delivery of tertiary abatement catalyst reactors for our three NAPs at Kooragang Island in August 2022, the first time tertiary abatement catalyst has been deployed to Australia. Commissioning at Kooragang Island will commence progressively from October 2022. Looking ahead, our focus turns to our Yarwun facility in Gladstone, Australia, which has a scheduled maintenance shutdown in 2024. For more information, see the case study in the *Catalysing Climate Action* section with more quantitative information available in the *Targets and Performance* section.

We operate one ammonia plant globally at Kooragang Island which generates hard-to-abate Scope 1 emissions. CCUS, and hydrogen produced from renewable energy (green hydrogen) technologies, will play an important role in decarbonising emissions from ammonia production.

In partnership with MCi, this year we supported the planning and design of a CCU mobile demonstration plant at our Kooragang Island facility, with construction and commissioning scheduled for 2024. The demonstration plant will abate up to 3 $ktCO_2$-e per year and is a critical step in the commercialisation and scaling of mineral carbonation technology.

We have entered commercial arrangements with Origin Energy to progress the development of the Hunter Valley Hydrogen Hub in New South Wales (NSW), Australia (see case study on page 27).

In Queensland, Australia, we established a partnership with H2U – the Hydrogen Utility® to progress the H2-Hub™ Gladstone project. The project has a planned capacity of up to three gigawatts of electrolysis and up to 5,000 tonnes per day of green ammonia production. Planning and environment approvals commenced in August 2022.

Potential future production offers a green ammonia source for our Yarwun AN manufacturing facility.

Other industrial processes are presently hard-to-abate. For example, industrial heat and steam for chemical production relies on fossil fuel combustion in boilers and other equipment. Fuel switching (e.g. biomethane) presents short-term opportunities, but direct electrification of large production processes is not presently technically or commercially viable.

Scope 2 abatement

Our pathways to mitigate Scope 2 emissions rely on optimising energy use through energy efficiency and increasing the proportion of renewable energy in our mix.

This year we continued to investigate energy efficiency opportunities. Improved energy efficiency through process optimisation, equipment upgrades and waste heat recovery has the potential to translate into a net reduction in energy consumption. Such opportunities are identified as part of ongoing plant operations and typically targeted for implementation in future continuous manufacturing planned shutdowns.

Purchased electricity is the largest source of our Scope 2 emissions, with our Australian operations

STRATEGY AND DECARBONISATION

representing over 60 per cent of our global electricity consumption. From 2025, our operations in NSW, will be powered by renewable electricity. This year, we entered into a power purchase agreement for the supply of renewable electricity from the Wellington North solar farm near Dubbo, NSW. Looking ahead, we are prioritising sourcing renewable electricity in Australia, Canada and Sweden.

DECARBONISING VALUE CHAIN EMISSIONS

We are committed to playing our part to mitigate the impact of our value chain emissions. However, due to the nature of Scope 3 emissions, much is outside our direct control. Our actions are focused first on understanding the sources of our Scope 3 emissions and reliably quantifying them, then identifying how we can work with suppliers and customers to help reduce Scope 3, using our relationships and influencing position.

Last year, we established a baseline Scope 3 emissions inventory and announced our net zero emissions ambition, which covers Scope 3 emissions from purchased ammonia and ammonium nitrate. This year, our focus was on maintaining security of supply as global ammonia and AN supply was disrupted by geopolitical events with our existing supply arrangements dramatically altered due to the Russia-Ukraine conflict. In response, ammonia and AN was sourced from a range of new suppliers where it was globally available. Engaging with our new suppliers to understand product and transport emissions and recalculating Scope 3 emissions from our purchased goods and services is a priority. Looking ahead, we continue to develop a value chain decarbonisation strategy and consider a range of possible commitments, actions and collaborations to deliver on our net zero emissions ambition.

Pathways to Scope 3 abatement

Our global approach to reducing Scope 3 emissions is predicated on building a comprehensive emissions baseline, gradually filled with actual supplier data. As a result, value chain decarbonisation strategies can be established, comprising:

- holistic reduction targets;
- levers to reduce emissions including revisiting product design choices, alternative sourcing strategies, procurement standards and criteria;
- collaboration opportunities across supply chains to implement abatement levers, progress technological research and maximise impact;
- signals that leverage organisational scale to drive up demand to lower the cost of green alternatives and solutions; and
- internal governance mechanisms that align the incentives of decision-makers with Scope 3 emissions reduction.

Presently, our focus centres on our upstream supply chain. For example:

- lower-carbon sourcing: medium to long-term sourcing of advanced biofuels, other lower carbon fuels and lower emissions-intensive ammonia to feed our ammonium nitrate manufacturing plants around the world;
- supplier engagement: our net zero emissions ambition covers Scope 3 emissions from purchased ammonia and ammonium nitrate. While we share a commitment to reduce emissions with our strategic suppliers, we have key levers at our disposal to further reduce indirect emissions in our value chain:
  - engage with our suppliers to collect more accurate emissions data and influence the most material suppliers to set their own emissions reduction targets;
  - embed GHG emissions considerations into the supplier selection process over the long term, as supply chains align on targets and commitments; and
  - evolve future product and service design and procurement policies.
- offsetting: emissions avoidance, nature-based activities and carbon sinks can support the transition towards net zero emissions. With changes in land use and management, this can reduce GHG emissions and increase carbon dioxide (CO_2) absorption by creating and expanding natural sinks, supporting biodiversity, improving water quality and aiding in the social development of local communities.

Understanding how to enable better blasting

Delivering on Orica's sustainability priorities means helping our customers achieve their sustainability goals. Our most material opportunity is to leverage the chemical energy in explosives to improve ore fragmentation and deliver a step change in downstream mine processing efficiency.

The use of electricity to mill ore and raw materials and undertake downstream processing is usually the largest consumer of energy on a mine or quarry site. By using explosive energy in the pit to produce much finer ore, we can increase the efficiency and throughput of the downstream comminution processes of crushing and milling. The overall energy consumption from mine-to-mill can be reduced with a consequent reduction in GHG emissions[1].

While the GHG emissions reduction related to improved ore processing falls outside of Orica's Scope 3 boundary, our Design for Outcome services and mine-to-mill digital proposition offers new opportunities to accurately measure and quantify productivity, efficiency and emissions benefits for our customers.

Orica research and innovation

This year we formulated an ESG Data Strategy and a minimum viable IT solution was deployed at our Kooragang Island manufacturing site. The platform will be progressively enhanced over the coming years to support customer ESG provenance and data transparency, from mine-to-mill.

This year, our research and innovation team continued to implement our Clean Technology Roadmap as part of our climate change and broader sustainability priorities.

Several commercial-in-confidence initiatives are being pursued to progress early technological development for decarbonised explosives to help our customers meet their sustainability goals.

We also:

- completed a hydrogen to ammonia research and development project with CSIRO funded by ARENA[2]. The project demonstrated the conversion of hydrogen to ammonia at significantly lower pressures than conventional processes, thus requiring lower energy inputs; and
- continued to support our long-term joint venture with MCi as they drive their CCU technology toward commercialisation. This year we supported the design, engineering and approvals for construction of a demonstration-scale mineral carbonation plant at our site in Kooragang Island, Australia. The plant is scheduled for completion in 2024 and will react waste CO_2 from our operations with alkaline materials to produce a range of lower-carbon products for construction, manufacturing and consumer markets. It is envisioned that future MCi carbon plants could scale up to several million tonnes of CO_2 conversion and removal in any suitable industrial site.

OUR PARTICIPATION IN CARBON MARKETS

Compliance

We participate in the carbon market through compliance mechanisms in Alberta, Canada[3] (Carseland facility) and Australia[4] (Kooragang Island and Yarwun Nitrates facilities).

A price on carbon, through an emissions-trading program, tax mechanism or baseline-and-credit schemes, provides heavy emitters an important economic incentive to cut GHG emissions in the form of revenue or cost avoidance, promoting investment in decarbonisation.

Orica is well positioned to manage the impact of carbon regulation on our business. Our strategy is to pre-position the company on the supply-side of carbon markets and continue to accelerate our decarbonisation in anticipation of tightening global rules. We are making good progress. Industrial carbon projects are registered in Australia and Canada (see below) and regulated[5] Scope 1 GHG emissions have reduced 13 per cent since 2019. Best-available tertiary catalyst abatement is now operational at Carseland, Canada.

We support pricing carbon and believe governments around the world should consider compliance mechanisms while maintaining the relative competitiveness of industry between trading nations. Some governments are establishing a carbon border adjustment mechanism as a trade tool to incentivise deeper decarbonisation among foreign producers, while protecting their export and local manufacturing capacity. These tools are an effective policy and we expect their implementation to expand over time.

Voluntary

The other form of carbon market participation is in the secondary or voluntary market. Since COP26[6] and the agreed finalisation of Article 6[7] of the Paris Agreement, international voluntary carbon markets now have the framework to scale at pace, can offer an alternative revenue

(1) G. F. Brent, 2010, Greenhouse gas implications of explosives and blasting, Rock Fragmentation by Blasting – Sanchidrián (ed). CEEC, 2013, Ultra-High-intensity Blasting – A new Paradigm in Mining, accessed www.ceecthefuture.org.

(2) The Australian Renewable Energy Agency.

(3) Technology Innovation and Emissions Reduction Regulation.

(4) National Greenhouse and Energy Reporting (Safeguard Mechanism) Rule 2015.

(5) Regulated Scope 1 emissions from our manufacturing facilities in Canada (Carseland, Alberta) and Australia (Kooragang Island, NSW and Yarwun Nitrates, QLD).

(6) The 26th Conference of the Parties (COP) or the 2021 United Nations Climate Change Conference.

(7) Article 6 pertains to the establishment of international compliance carbon markets governed by the rules of the Paris Agreement where countries can trade carbon credits.

STRATEGY AND DECARBONISATION

stream for decarbonisation activities and an ability to de-risk final investment decisions.

In Australia, two voluntary industrial Emissions Reduction Fund projects are registered with the Australian Government, presenting options to meet future compliance obligations and voluntary corporate commitments. Crediting of eligible carbon units (e.g. ACCUs) is expected to commence from FY2023 for the Kooragang Island Decarbonisation Project.

Given our global presence and share of assets and landholdings, there may also be opportunity to participate in carbon project development beyond industrial process emissions abatement. By developing a portfolio of carbon projects that can supply carbon credits to meet our own emissions reduction commitments, we may be able to generate a revenue stream from surplus credits that can be sold in secondary markets. This presents an opportunity to help voluntary carbon markets scale and provides avenues to realise the multiple co-benefits of carbon project development, including local community and Indigenous employment and projects that help restore nature and maintain biodiversity while also promoting carbon drawdown.

As an action, in FY2023 we are developing a carbon market strategy to guide our future approach.

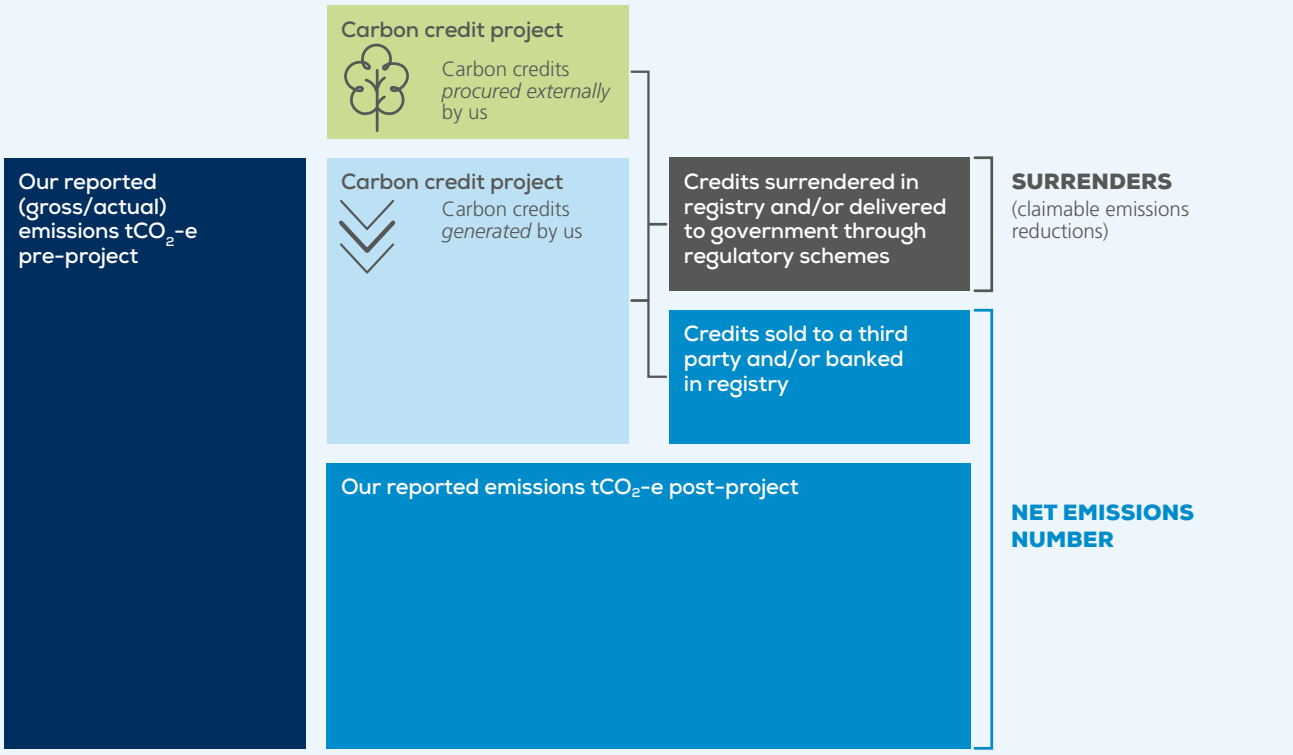
Transparent accounting

We are committed to transparency around how we manage and account for carbon credits. Annual emissions reductions should be claimed where surrender has occurred, or it can be demonstrated that carbon credits sold under a government program are cancelled by the Authority so they cannot be attributed twice.

To avoid double counting[1] of carbon credits generated through offset projects, we do not claim:

- annual emissions reductions for carbon credits that are yet to be surrendered or reach a final destination – these are included in our overall net emissions number; and
- annual emissions reductions for carbon credits sold in voluntary secondary markets or through direct commercial arrangements – these are included in our net emissions and reported separately in our annual reporting.

OUR APPROACH TO ACCOUNTING FOR CARBON CREDITS



(1) *An organisation selling a carbon credit might claim the underlying emissions reduction for itself, while at the same time, another organisation buying the credit also claims the same emissions reduction.*

PORTFOLIO ANALYSIS

We test our business strategy against a range of plausible future climate scenarios. While not forecasts, our scenarios illustrate conceivable futures that may emerge over the short, medium and long-term. They are designed to be plausible, relevant and challenging to test the resilience of our strategy, and enable the business to evaluate capital, market and commodity opportunities, as well as climate-related risks.

SCENARIOS

Since FY2016 we have performed climate-related scenario analysis. In FY2020, important changes were made to our approach to align Scenario 1 with a 1.5°C pathway. Additional quantitative metrics were also adopted across our macroeconomic scenarios.

A summary of our scenarios is shown below. Detailed representations are outlined in Appendix 3.

	1 **Scenario 1: Ambitious, coordinated global climate action** Global warming: 1.5°C Global GDP growth: 2.2%	2 **Scenario 2: Widespread nationalistic economic policy** Global warming: >4.0°C Global GDP growth: 1.0%	3 **Scenario 3: Emergence of new regional growth centres** Global warming: 3.0°C Global GDP growth: 3.6%
Macro and Policy	Transition to a lower-carbon economy becomes one of the drivers of global economic growth, partly offset by softer end-use consumption	Increasing nationalism leads to limited global cooperation, reversal of free trade, and ultimately suppressed growth in economic output	Emergence of new economic growth centres – India and Africa – supported by a favourable global trading and investment environment
Technology	Broader innovation, technology investment drives accelerated adoption of new technology; breakthrough cleantech, early retirement of conventional	Weak investment limits R&D activity and commercialisation of new technology	High capacity to invest in technology development leads to a proliferation of innovative products; accelerated technology adoption profile
Market	Consumer and stakeholder preferences evolve towards building a zero-emission circular economy	Consumers and the industry are driven by economic choices and rely on conventional options	Strong adoption of lower-carbon emission technologies in developed world; India and Africa progress along a more conventional pathway
Climate Change	Global cooperation and commitment amongst governments to address climate change puts global emissions on the 1.5°C trajectory	Governments abandon global climate change commitments; focus shifts to adaptation and resilience	Governments deliver on stated policies; US, EU and China ramp up their responses in an effort to offset additional emissions from India and Africa

CAUTIONARY STATEMENT REGARDING SCENARIO ANALYSIS

The scenario analysis process is designed to challenge our thinking on possible future macroeconomic and global temperature warming outcomes. The scenarios are not probability-weighted and represent a range of hypothetical external environments.

There are challenges in predicting how the path to a lower-carbon economy may unfold. The use of scenarios can help highlight the breadth of risks and opportunities that climate change will pose on our operations and markets. However, our risk and opportunity assessment analysis is ongoing, and the details and assessments are subject to change over time.

We update the underlying assumptions from time to time and monitor specific external signposts. These are designed to indicate the changes in the most-likely (base case) outcome relative to our scenarios.

A cautionary statement on forward-looking statements is found at the beginning of this report. As with all scenarios, the projections of each scenario should be treated with caution. We expect actual outcomes will likely differ substantially from those implied by the scenarios.

Presently, our scenario analysis is focused on transition risks and opportunities across policy, markets, commodities and technologies.

As part of our annual review in FY2022 we have updated our base case assumptions based on external signposts. There is more work to do to expand our scenario analysis to understand possible long-term risks associated with other drivers, such as emerging carbon pricing policies like carbon border adjustments, and changes in the physical climate and resultant impacts to our markets and operations.

In FY2023, we plan to conduct the next iteration of scenario analysis and will consider new information recently published by the International Energy Agency[1], the latest suite of IPCC AR6 reports[2] plus other relevant third-party analyses.

A full briefing on the results of our last scenario updates can be found in the 2021 Climate Action Report. A summary of the key findings from the analysis are outlined on the following page.

(1) IEA, May 2021, Net Zero by 2050 – A Roadmap for the Global Energy Sector.

(2) Intergovernmental Panel on Climate Change (IPCC) Sixth Assessment Reports: Working Group I (2021), Working Group II (2022), Working Group III (2022) and the Synthesis Report (in progress, due late 2022 or early 2023).

Analysing future commodity demand

To help illustrate the evolution of demand and revenue mix under various future scenarios, our most exposed commodities are grouped into three categories based on their sensitivity to the lower-carbon economy transition.

Future-facing commodities
Experience elevated demand in a lower-carbon economy. Includes copper, nickel, lithium and other metals and minerals supporting clean energy technologies.

Neutral commodities
While impacted by the transition, mostly driven by other trends. Includes gold, iron ore, limestone and other crushed stone (used in quarry and construction).

Commodities in decline
Primarily and negatively impacted by transitioning to a lower-carbon economy. Includes thermal coal and metallurgical coal.

Our analysis models the demand changes in these commodity groups across our different scenarios. The results are shown below and adjacent. Refer to Appendix 3 and 2021 Climate Action Report for more detail.

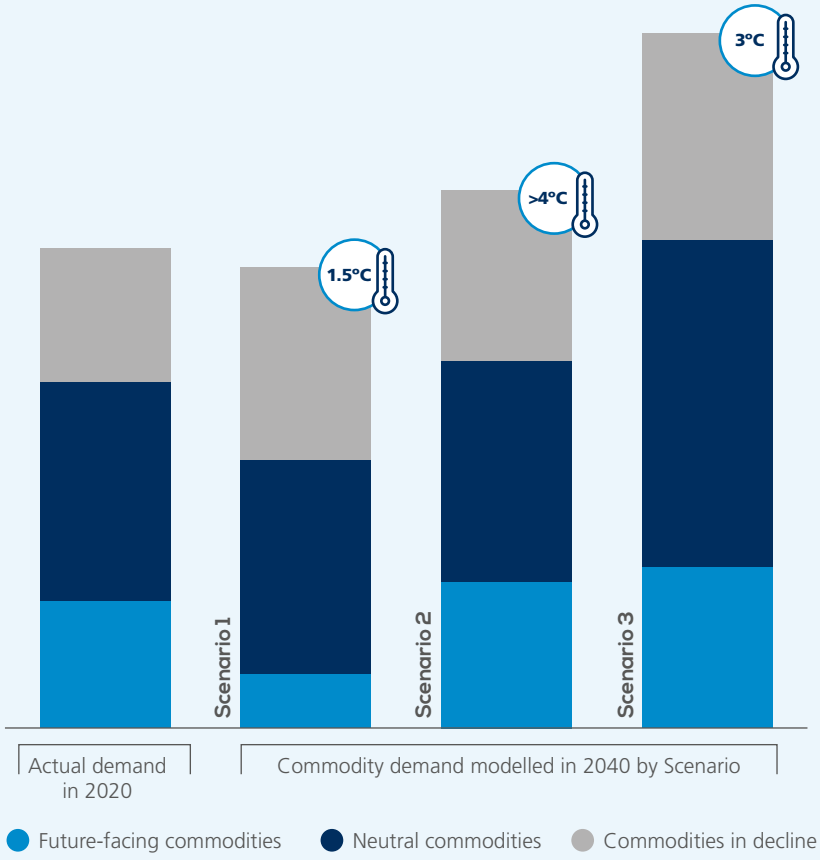
Chart 1: Absolute change in commodity demand in 2040 vs 2020

Note: Other future-facing metals and minerals supporting clean energy technologies (e.g. nickel, lithium, and cobalt).

Source: Orica research and analysis based on various data sources including IEA and Wood Mackenzie.

PORTFOLIO ANALYSIS

Chart 2: Actual vs scenarios revenue by commodity in real terms (in absence of any mitigating actions)



Note: 'Future-facing commodities' include copper, nickel, lithium and other metals and minerals supporting clean energy technologies; 'neutral commodities'; include gold, iron ore, limestone and other crushed stone (used in quarry and construction); 'commodities in decline' include thermal coal and metallurgical coal.

Source: Orica research and analysis.

Across the scenarios, we found:

- **Scenario 1:** our revenue experiences a moderate long-term decline. While the revenue from thermal, and to a lesser extent, metallurgical coal diminishes, this is only partially offset by an increase in revenue from future-facing commodities.
- **Scenario 2:** our revenue increases moderately due to ongoing demand for copper, gold, limestone and other crushed stone in their traditional applications.
- **Scenario 3:** our revenue increases strongly out to 2040 in this scenario. This is based on a static revenue contribution from commodities in decline and an increase in revenue from other commodity groups.

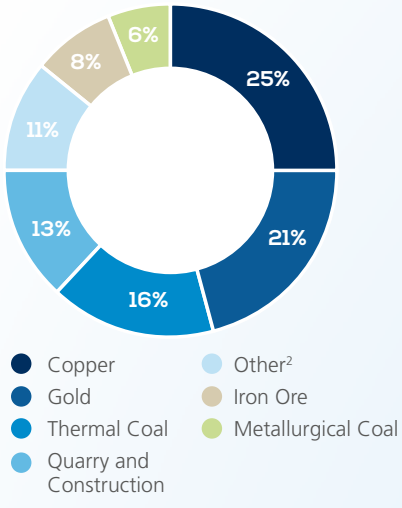
OUR RESPONSE

We continue to diversify our commodity exposure and position our portfolio towards higher growth commodities, including future-facing resources.

As much of the world is in an energy transition, demand for copper, nickel and other future-facing commodities will remain strong. These commodities are crucial to the manufacture of low-emissions technologies that enable a transition, such as batteries for electric vehicles, solar panels and wind turbines. To achieve the goals of the Paris Agreement, production of these commodities will need to continue to increase at pace. Despite price fluctuations in several commodities, demand is expected to remain strong.

Our commodity mix reflects a diversified portfolio across coal and metals markets. Gold and copper markets remain the largest commodity exposure, collectively representing 46 per cent of FY2022 revenue, and are important across all operating regions. Thermal coal revenue exposure fell to 16 per cent in FY2022.

Revenue by Commodity[1]



(1) Based on external sales, excluding Minova.

(2) Includes Orica Monitor.

PORTFOLIO ANALYSIS

Blasting in mining for metals and coal remains the core of our business, however we are growing our market share in quarry and construction and future-facing commodities which form a considerable proportion of mining pipelines in Latin America and Australia Pacific Asia (APA).

In Latin America, the ongoing shift in the region's commodity exposure reflects strong recovery in copper customer demand and the large proportion of our customers' mining pipeline focused on future-facing commodities. Copper revenue increased five per cent from FY2021. This shift towards gold and copper has been further increased by new contracts and strong cyanide demand.

In APA, we are continuing to focus on growing our exposure to other future-facing commodities, particularly nickel and lithium. While this provides growth opportunities for our blasting business, it also provides increasing digital solutions opportunities, particularly in the exploration/ resource definition phase and the processing efficiency phase.

The Russia-Ukraine conflict has created a global energy crisis. Energy flows, particularly oil and natural gas, have been disrupted, leading many countries to continue to rely on thermal coal as a key part of their energy mix.

While thermal coal production is still expected to decline, shorter-term production remains strong across our operations in Indonesia, East Asia, Australia and the United States.

As we continue to rebalance our portfolio our approach focuses on:

- continuing to service our coal customers in the medium term, acknowledging the right of emerging economies to develop, while seeking opportunities to partner with our customers in their efforts to transition to a lower-carbon economy;
- leveraging our expertise in science and technological innovation to develop sustainable products and services for our customers and foster smarter, safer mining with the potential to enable emissions savings across the mining sector's value chain;
- maintaining momentum in reducing exposure to future carbon pricing by accelerating our decarbonisation; and
- continuing to strengthen our scenario analysis and assess and capture growth and diversification opportunities to increase our exposure to commodities that contribute to a lower-carbon future, such as copper.

CAPITAL ALLOCATION AND CONSIDERING THE COSTS OF CARBON

Capital expenditure strategy

Our industrial manufacturing facilities have long lifespans. This means the investment decisions we make in coming years will influence our efforts to decarbonise as we consider adopting lower-emissions technology options.

Demand for critical energy minerals is expected to grow dramatically. Major economic opportunities exist in mining and minerals extraction for copper, lithium, cobalt, nickel and other future-facing commodities. To continue enhancing our competitiveness, we apply a disciplined approach to capital expenditure to support the base business and pursue new opportunities, including growth in servicing future-facing commodities.

Our capital expenditure process is subject to rigorous review and approval processes, with large investments overseen by the Orica Investment Committee (OIC). To inform group capital decisions, a representative of the Sustainability and Government Relations team is embedded in the OIC, bringing decarbonisation and transition considerations to the Group's capital allocation process.

PORTFOLIO ANALYSIS

Impairment testing did not identify the requirement for adjustments to future cash flows at this time.

In FY2022, we spent $36 million on sustainability sustenance capital, which includes $21 million towards reducing our GHG emissions at Kooragang Island, Carseland and Yarwun. This investment enables the ongoing decarbonisation of our manufacturing processes and products, mitigating carbon policy liability costs, as well as enabling the offering of lower-carbon AN products and blasting to our customers.

Impairment

As part of the Group's ongoing integration of climate risk considerations into financial analysis and forward planning, we again incorporated the allocated capital to our decarbonisation activities into asset impairment testing, as forecasted capital expenditure and costs. These are the capital outflows required to meet the Group's commitment to reduce Scope 1 and 2 emissions by at least 40 per cent by 2030. Testing was informed by our strategic scenario analysis process but did not identify the requirement for adjustments to future cash flows at this time. As the Group continues to strengthen the integration of climate risk considerations into financial analysis and forward planning, financial implications stemming from climate change will continue to be considered and built into future cash flow assumptions. For more details, refer to our 2022 Annual Report.

Carbon pricing

We anticipate carbon prices will progressively be adopted around the world and increase over time. National carbon and energy policies in key jurisdictions where we operate have been strengthened, including the proposition of the European Union's Carbon Border Adjustment Mechanism (CBAM) and similar policies being considered by other major economies.

The introduction of CBAM from 2023 (transitioning into force by 2026) was presented to initially cover product-related emissions from imported steel, aluminium, iron, cement, fertilisers and power generation. Recent policy updates have broadened the scope of sectors covered to include organic chemicals, plastics, hydrogen and ammonia. We are working to understand the potential cost and supply impacts associated with ammonia and ammonium nitrate import activity in the EU, to maintain our competitiveness.

While more economies are expected to pursue carbon border adjustments, any policy mechanism should be non-discriminatory and consistent with World Trade Organisation, plurilateral and bilateral trade commitments. Traditional solutions to maintain industry competitiveness have compensated trade-exposed industries when stronger local emissions reduction policies are implemented.

Carbon border adjustments could offer an alternative approach and be an effective global climate policy framework to help enable stronger emissions reduction policies. All governments should fully examine the mechanism framework and compare it to alternative options for maintaining industry competitiveness.

While a variety of market and regulatory carbon pricing levers are adopted by government's worldwide, we continue to advocate for carbon pricing policies that maintain the global competitiveness of trade-exposed industries to prevent carbon leakage[1].

Our major manufacturing sites in Australia and Canada are exposed to carbon regulation schemes and pricing. We are confident ongoing investment in emissions reduction will assist to manage future potential liabilities.

(1) Carbon leakage refers to the shift of emissions-intensive industries from production locations with regulations and penalties on GHG emissions to production locations without these regulations. This should be prevented as it results in GHG being emitted elsewhere globally when the aim is to avoid the emissions being released, through a policy mechanism and financial penalty to the emitter (company).

PORTFOLIO ANALYSIS

Internal carbon pricing

An internal price on carbon creates a theoretical cost per tonne of GHG emissions. Orica is progressively using it to better understand the potential impact of external carbon pricing on the profitability of projects and investments as well as assessing potential opportunities with new business models.

During the year we expanded the practice. A summary of FY2022 applications and prices is shown below.

Application	Internal carbon price type	Description
Group capital planning	Shadow carbon price	Applied to internal decarbonisation business cases to inform investment decisions. In jurisdictions where a regulated carbon price is present, that price is incorporated into our business case. Where uncertainty exists, we apply a shadow carbon pricing range of US$30/$tCO_2$-e to US$60/tCO_2-e to understand the potential financial exposures under different future carbon pricing and regulatory scenarios.
Scenario analysis	Shadow carbon price	For strategic planning, we adopt shadow carbon pricing as a cross-cutting policy intervention in scenario assumptions. Carbon prices vary according to scenario (refer Appendix 4). The outcomes assist to understand carbon price risks, particularly impacts to changing commodity demand.
Corporate development	Shadow carbon price	We apply shadow carbon pricing assumptions in Merger and Acquisition (M&A) activities which would materially impact our GHG emissions footprint. For M&A, we apply a shadow carbon price informed by the asset location, incorporating existing regulatory carbon pricing policies for that jurisdiction, applying cost increase assumptions over time, and considering planned policies which may increase this cost further over the coming decade. For assessing new green technology and lower-carbon product offerings, we assessed this using a shadow carbon pricing range of US$20/$tCO_2$-e to US$50/tCO_2-e.
Commodity analysis	Market price	Current and future carbon prices are applied in commodity demand analysis (such as thermal coal demand in electricity generation sector) and production cost modelling (such as ammonium nitrate).
Sourcing and procurement	Market price	Where cost increases are experienced due to regional emissions regulation and carbon pricing, the costs are validated by applying the regulatory price at the time.
Regional sales	Market price	Where cost increases are anticipated for our operations due to emerging emissions regulation and carbon pricing policies, costs are considered as part of Orica's normal pricing models.

In FY2023 we will continue to embed the application of shadow carbon pricing in our strategic and financial planning.

An internal price on carbon creates a theoretical cost per tonne of GHG emissions. Orica is progressively using it to better understand the potential impact of external carbon pricing on projects and investments as well as assessing potential opportunities with new business models.

No one company can create the transition alone

CATALYSING CLIMATE ACTION

Achieving a low-carbon transition requires innovation, government support incentives and rapid technology development and deployment across all sectors of the economy. We believe our innovation and technology expertise can be a catalyst to improve our response and the action of our customers to climate change.

We are committed to understanding our role in the transition to a lower-carbon economy. However, no one company can create the transition alone – it takes partnerships and collaboration between governments, businesses and industries. Throughout FY2022, we have progressed collaborations on various fronts to explore our role in enabling the transition.

DEPLOYING BEST-AVAILABLE TECHNOLOGY

Eliminating Scope 1 nitrous oxide emissions from our NAPs continues to be central to our decarbonisation efforts. See the case study overleaf for a snapshot of the progress made this year.

Mitigating industrial process emissions

This year, we benefitted from our investment in tertiary catalyst abatement installed at one of our NAPs at Carseland, Canada in October 2021. In the first year of operation, the site's Scope 1 and 2 GHG emissions intensity per tonne of AN produced reduced by 46 per cent compared to the previous year.

Important milestones were achieved by the Kooragang Island Decarbonisation Project. Delivery of three tertiary abatement reactors occurred in August 2022 with installation proceeding at NAP No. 1 in September 2022. Commissioning is taking place in October and November 2022. In an Australian first, the tertiary catalyst abatement technology will be deployed across the remaining two NAPs in FY2023. The $37M project represents a partnership with the NSW government and the Clean Energy Finance Corporation.

Our continuous manufacturing site at Yarwun, Gladstone is in the early stages of large-scale decarbonisation. This year, we registered an Emissions Reduction Fund project with the Clean Energy Regulator and secured a Carbon Abatement Contract with the Australian Government.

While these steps are fundamental to realising the Yarwun Nitrates Decarbonisation Project, we temporarily set aside a final investment decision. Changing climate policy and regulatory settings present increased investment uncertainty in Australia. A final investment decision is dependent on the Australian Government finalising Safeguard Mechanism reforms and a review of the Australian carbon market.

The $37M Kooragang Island Decarbonisation Project represents a partnership with the NSW government and the Clean Energy Finance Corporation.

Photo: EnviNOx® technology by thyssenkrupp Industrial Solutions AG, Dortmund, Germany.

CATALYSING CLIMATE ACTION

SUPPORTING NEW TECHNOLOGY

Green hydrogen

Green hydrogen, produced via electrolysis using renewable electricity sources, has emerged as a potentially significant enabler of the transition to a lower-carbon economy. In FY2022, we commenced two partnerships to better understand the application of green hydrogen for some of our key Australian sites.

Scaling mineral carbonation

Since 2013, we have supported MCi, an Australian start-up focused on developing technologies to safely turn carbon dioxide emissions into valuable products. MCi uses engineering processes to convert captured carbon dioxide emissions from industrial sources into solid materials, known as carbonates. These can be used to manufacture a variety of building and construction products including plasterboard, cement and concrete.

The technology is an important demonstration of enhanced carbon capture and conversion by using circular economy principles in an industrial setting. At COP26, MCi was the winner of the 'Best Clean Energy Startup' out of 2,700 global solutions.

In FY2021, MCi was awarded one of six grants announced under the Australian Government's CCUS Development Fund. With Orica's support, a mineral carbonation mobile demonstration unit is being designed and commissioned at our Kooragang Island manufacturing facility to capture carbon dioxide from ammonia manufacturing processes.

MCi carbon plants are intended to scale up to several million tonnes of carbon dioxide conversion and removal in any suitable industrial site.

Orica research and development partnerships

Opportunities to participate in industry research and development partnerships is part of our climate change strategy, to advance hard-to-abate decarbonisation initiatives, learning and ultimately progress. For more information see *Orica research and innovation* in this report or *Partnering for progress* in our 2022 Annual Report.

Clean Technology Roadmap

We live in an era where technological advancements are occurring at a rapid pace. This year, our Research and Innovation team developed a Clean Technology Roadmap in support of our refreshed Sustainability Strategy and climate change goals. Several ongoing and new priorities are foreshadowed covering:

- advancing concept studies for zero emissions heavy Mobile Manufacturing Unit fleet;
- continued support for MCi and their technology commercialisation;
- embedding our lifecycle assessment tool to better understand carbon impacts of our products and help prioritise areas for future design and formulation improvement to reduce environmental and social impacts; and
- trialling patented novel blasting techniques to deliver more finely crushed ore for efficient comminution as well as increasing ore recovery during processing, and customer energy, cost and emissions benefits due to reduced grinding energy, increased mill throughput and increased ore recovery.

Hydrogen hub precincts

To demonstrate our commitment to creating a more sustainable future for our manufacturing regions, we entered into strategic partnership agreements in Newcastle and Gladstone to explore green hydrogen and green ammonia opportunities, respectively. These projects mark an important step in transitioning our business model towards a lower-carbon economy, by partnering for progress with leading organisations. We are committed to exploring opportunities to diversify, ensuring our manufacturing facilities remain competitive in a lower-carbon economy, while creating more sustainable products for customers and broader applications for industry.

HUNTER VALLEY, NSW

In Newcastle, we partnered with Origin Energy to assess the viability of a green hydrogen production facility, the 'Hunter Valley Hydrogen Hub', and associated value chain in the Hunter Valley.

Through a Memorandum of Understanding (MoU) signed in February 2022, we embarked on a feasibility study to assess the ways an industrial hydrogen hub could support a meaningful green hydrogen industry in the region and beyond. The proposed hub would produce green hydrogen from recycled water sources and renewable electricity, using a grid connected 55MW electrolyser. Community consultation is underway with project approvals and an investment decision expected in 2023.

GLADSTONE, QLD

In April 2022, an MoU was signed for a master plan study with H2U – the Hydrogen Utility® (H2U), initiating the first phase of a proposed H2-Hub™ Gladstone. This study will explore opportunities for an exclusive domestic green ammonia offtake and supply agreement, which would see our Yarwun manufacturing plant supplied with green ammonia from H2U's proposed Yarwun green ammonia production plant.

The H2-Hub™ Gladstone, a multi-billion industrial-scale green hydrogen and ammonia production facility, has a planned production capacity of up to three gigawatts of electrolysis and up to 5,000 tonnes per day of green ammonia. The proposed facility is expected to use 100 per cent renewable energy from new-build solar and wind resources in the Queensland region of the National Electricity Market. It could also contribute to improving the reliability of renewable electricity supply, with the integration of new renewable generation assets in Central Queensland.

The H2-Hub™ Gladstone would leverage pre-existing industrial and port ecosystems to produce and supply green ammonia directly to domestic customers, and support export capabilities of green ammonia to key North Asian and European economies.

CATALYSING CLIMATE ACTION

INDUSTRY COLLABORATIONS

Australian Industry Energy Transitions Initiative

We are a founding member of the Australian Industry Energy Transitions Initiative (Australian Industry ETI). Since launching in July 2020, participants across Australia's critical supply chains have come together to explore market, technology and decarbonisation opportunities, understand barriers and challenges and identify areas of mutual interest.

The Australian Industry ETI is structured around three phases exploring:

- the current status and future potential for low and zero emissions technologies in Australia's major industrial supply chains – phase 1 was completed in June 2021;
- regional decarbonisation opportunities in Australia's major industrial precincts including relevant locations for Orica's facilities in the Hunter Valley and Gladstone – phase 2 was completed June 2022 (see summary adjacent); and
- pathways towards industrial decarbonisation by 2030 – phase 3 due for completion late 2022.

As the ETI enters its closing phase, we will continue to support the identification of opportunities and deploy investment in our own operations and industrial regions. With partners from the initiative, we will work together to develop projects and priority actions to enable decarbonisation across industry supply chains.

CLIMATE LEADERS COALITION

The Climate Leaders Coalition (CLC) was founded in August 2020 by The B Team Australasia with the aim to help companies accelerate their decarbonisation work.

The CLC has closely examined renewable energy, deep-decarbonisation technologies, regional and community transitions, cross-sector partnerships, Scope 3 reporting, finance and internal carbon pricing schemes.

In October 2021, a Roadmap to 2030 was published to share these learnings and enable other businesses across the economy to accelerate their decarbonisation journey.

CATALYSING CLIMATE ACTION

Australian ETI phase 2: Setting up industrial regions for net zero

REPORT SYNOPSIS

The '*Setting up industrial regions for net zero*' report looked at Australia's major industrial regions – the Pilbara, Kwinana, Hunter, Illawarra and Gladstone – which have the natural resources, workforce and baseline infrastructure to expand and support Australia's net zero transition.

The report shows it is possible for these five regions to achieve an 88 per cent reduction in their current emissions, which collectively accounts for approximately 12 per cent of Australia's total emissions. This is equivalent to 70 $MtCO_2$-e of abatement, or to removing all emissions from cars and light commercial vehicles across Australia.

The report is the result of a two-year collaboration between some of Australia's largest companies, as part of the Australian Industry ETI, and has now entered its final phase.

It shows that industrial regions can contribute to reaching state and national net zero emissions targets by 2050, while driving employment growth and building Australia's climate resilience.

The required renewable energy infrastructure, green hydrogen and energy storage has the potential to create job opportunities for 178,000 to 372,000 Australians. The report finds that investment in these regions and enabling infrastructure will be in the order of $50 to $100 billion.

RELEVANCE FOR ORICA

In the '*Setting up industrial regions for net zero*' report it was found that the total abatement potential of key industrial regions that Orica is present in – Hunter, Gladstone, Pilbara – could be up to 61 $MtCO_2$-e.

Both the Gladstone and Hunter Valley locations are strategically located and have been formally identified by the federal and state governments and the broader investment sector as future hubs for green hydrogen.

The potential role for Orica in green hydrogen is exciting and has the potential to secure jobs and industry in these regional communities. Green hydrogen is in the early stages of development in these precincts and will continue to face many challenges, including scaling up the technology to commercial levels, reducing the capital costs of electrolysers and the price of renewables, securing adequate government support, and developing demand and margins in traditional and new markets.

We will continue to rigorously assess the commercial case before we commit to next steps and maintain optionality around what role we can play in the green hydrogen supply chain.

SUMMARY OF DECARBONISATION OPPORTUNITIES IN AUSTRALIAN INDUSTRIAL REGIONS RELEVANT TO ORICA

Pilbara

Total abatement potential:
30.6 $MtCO_2$-e

Additional renewable energy required:
25.3 – 53.8 TWh

Additional investment required:
$17.8 – $38.4B

Estimated jobs opportunity:
102 – 243k

Gladstone*

Total abatement potential:
21.2 $MtCO_2$-e

Additional renewable energy required:
14.8 – 37.5 TWh

Additional investment required:
$14.2 – $33.6B

Estimated jobs opportunity:
34 – 89k

Hunter

Total abatement potential:
9 $MtCO_2$-e

Additional renewable energy required:
11.2 TWh

Additional investment required:
$10.3B

Estimated jobs opportunity:
24k

Bubble size is related to total potential abatement.
**Analysis for Gladstone was not in detail like other regions.*
Refer to 'Setting up industrial regions for net zero' report for more detail.

Source: Page 7, 'Setting up industrial regions for net zero' report, Australian Industry ETI.


ORICA
ORICA
BLAST MOVE
POLYGONS
VALUE
ORE LOSS
DILUTION
SMART

CATALYSING CLIMATE ACTION

ENABLING OUR PEOPLE

Engagement and incentivisation

This year, several events were held for our global business functions and regional teams to educate and share knowledge on sustainability topics including climate change, energy and emissions.

To meet our target of reducing operational GHG emissions by at least 40 per cent by 2030 and move towards our ambition of net zero emissions by 2050[1], everyone across Orica has a part to play. We are developing a new internal grant program, 'Towards Net Zero' and allocated funding to:

- create a culture that is aware of sustainability and climate change;
- incentivise climate action in our regions and engage staff, while helping to reduce our own operational emissions; and
- partner with customers, suppliers, peers and local communities to decarbonise our value chain and the locations in which we operate.

The 'Towards Net Zero' program will be further developed and launched in FY2023.

Looking ahead, we will develop and roll-out sustainability awareness development and training, including climate change-related training, to educate and empower our people to take action at a site-level.

Considering equality and the transition

We believe the path to a net zero emissions economy must represent a fair and equitable transition, to encourage sustainable development by realising environmental stewardship, decent work and social equity.

Decarbonisation of our industrial facilities contributes to the regional economies in which we operate and safeguards local manufacturing and jobs. It also strengthens the availability of lower-carbon manufacturing and exports to support competitiveness.

Planning a fair and equitable transition requires collaboration between governments, businesses and local communities. We acknowledge a rising interest in this area and look to better understand our role in enabling the transition for our workforce and the communities in which we operate.

"Planning a fair and equitable transition requires collaboration between governments, businesses and local communities."

(1) Our net zero emissions ambition covers our global Scope 1 and 2 emissions under our direct control, and material Scope 3 emission sources. Material means the GHG emissions embodied in purchased ammonia and ammonium nitrate included in the Scope 3 reporting category of purchased goods and services. These comprise around two-thirds of Orica's Scope 3 emissions footprint. Achieving this ambition will require effective government policy frameworks, supportive regulation and financial incentives, and access to new low-carbon technologies operating at commercial scale.

TARGETS AND PERFORMANCE

Our Targets

Reduce operational Scope 1 and Scope 2 emissions by at least

40%

BY FY2030 (FROM FY2019 LEVELS)

Source

100%

RENEWABLE ELECTRICITY BY 2040 (INTERIM STEP 60% BY 2030)

Our absolute GHG emissions reduction target is to reduce Scope 1 and 2 operational emissions by at least 40 per cent by FY2030, from FY2019 levels[1].

In FY2021 we also set an ambition to achieve net zero emissions by 2050. Our net zero ambition covers our global Scope 1 and 2 emissions (under our direct control) and material[2] Scope 3 emissions sources. Achieving this ambition will require effective government policy frameworks, supportive regulation and financial incentives, and access to new lower-carbon technologies operating at commercial scale.

This year, we achieved our emissions intensity target which is to maintain emissions intensity at or below 1.7 tCO_2-e/tonne AN sold by FY2022[3].

This intensity metric takes account of our global operational emissions and the Scope 3 emissions associated with the purchase of third-party ammonia and ammonium nitrate. We will continue to report our progress against this metric annually. Looking ahead, we are progressing value chain decarbonisation planning and will examine relevant metrics and opportunities to set Scope 3 commitments in FY2023.

In addition, this year we complemented our existing targets and announced a renewable electricity target which will see the business source 100 per cent renewable electricity by 2040, with an interim step of 60 per cent by 2030[4]. This signals our intent to further decarbonise our operations and enhance our competitiveness in a lower-carbon economy.

(1) Applies to existing operations. Base year emissions will be recalculated consistent with GHG Protocol emissions accounting standards if structural changes occur such as acquisitions or divestments. Our 2030 GHG emissions reductions target modelling has been informed by the Science Based Targets Initiative (SBTi) absolute contraction approach. We will consider setting a Science Based Target under the SBTi upon finalisation of the Chemicals Sector methodology.

(2) Material means the GHG emissions embodied in purchased ammonia and ammonium nitrate and included in the Scope 3 reporting category of purchased goods and services. These comprise around two-thirds of Orica's Scope 3 emissions footprint.

(3) Short-term emissions intensity target is above FY2020 performance due to forecast production increases in facilities with less effective abatement technology.

(4) The renewable electricity target boundary excludes small sites (e.g. single remote offices, depots, etc), markets where total consumption is less than 100 MWh/pa, or countries where credible sourcing options do not exist. This approach is consistent with industry standards.

TARGETS AND PERFORMANCE

OUR AMBITION

Net Zero emissions by 2050

Our net zero emissions ambition covers our global Scope 1 and 2 emissions under our direct control, and material Scope 3 emission sources. Material means the GHG emissions embodied in purchased ammonia and ammonium nitrate included in the Scope 3 reporting category of purchased goods and services. These comprise around two-thirds of Orica's Scope 3 emissions footprint. Achieving this ambition will require effective government policy frameworks, supportive regulation and financial incentives, and access to new low-carbon technologies operating at commercial scale.

Renewable energy

To accelerate our journey towards 100 per cent renewable electricity, we entered into a Power Purchase Agreement (PPA) with Lightsource bp for renewable electricity generated by its Wellington North solar farm in NSW, Australia. The farm will generate a total of 915 gigawatt hours of renewable electricity per year, saving over 730,000 metric tonnes of carbon emissions and will support the equivalent of around 50 per cent of our Australian electricity needs. This will reduce our global Scope 2 emissions by over 60,000 metric tonnes of carbon emissions annually, which is the equivalent of powering 19,000 NSW residences every year. Globally, the proportion of our electricity sourced from renewables will be around 30 per cent, once the Wellington North facility is fully operational.

Wellington North solar farm is expected to create over 400 jobs during construction and eight full time equivalent roles once fully operational in 2025.

OPERATIONAL EMISSIONS

Our gross operational Scope 1 and Scope 2 emissions for FY2022 were 1,943 $ktCO_2$-e. This represents a 2.4 per cent increase from FY2021 and an 11 per cent reduction from our base year of FY2019.

On a gross emissions basis, our global Scope 1 GHG emissions increased by 3.1 per cent from FY2021, driven primarily by increased production from the Yarwun and Bontang manufacturing facilities. Higher production volumes contributed 90 per cent to the overall emissions increase from FY2021. To balance this, tertiary catalyst abatement was installed at our Carseland facility in November 2021, abating 69 $ktCO_2$-e in Scope 1 emissions compared to FY2021. This has improved site-based Scope 1 and 2 emissions intensity per tonne of AN produced by 46 per cent.

Gross Scope 2 GHG emissions remained relatively stable from FY2021, decreasing 2.1 per cent. We continue to implement a range of energy efficiency initiatives across the business, and in FY2022, generated 360 MWh (0.1 per cent) of electricity from renewable sources.

While we currently use location-based accounting for our Scope 2 emissions, the announcement of our renewable electricity target and associated PPA transaction will require the use of market-based accounting methods going forward, to correctly calculate the Scope 2 emissions from our renewable purchasing choices. We plan to better understand market-based Scope 2 emissions accounting in FY2023 and look to conduct dual-reporting of Scope 2 emissions in the near-future, when we begin receiving renewable electricity attributes from the PPA transaction.

Through the surrender of ACCUs to mitigate a forecast compliance obligation, we have partially offset our operational emissions increase and our net emissions position for FY2022 is 1,883 $ktCO_2$-e, 14 per cent below our FY2019 baseline.

MANAGING OUR NET EMISSIONS POSITION

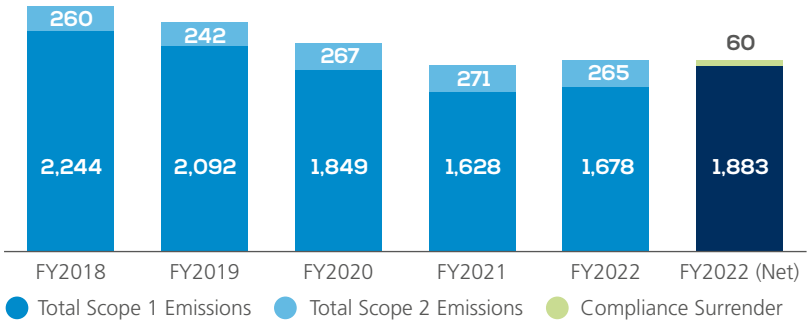
Our Yarwun manufacturing facility is reasonably likely to exceed its regulated Scope 1 emissions limit for the 2022-23 compliance year[1] under the Australian Safeguard Mechanism. Orica negated the excess emissions position by surrendering 60,000 prescribed ACCUs to reduce the net-emissions of the facility to meet regulatory compliance.

We have owned 50,000 ACCUs since 2018 and procured an additional 10,000 ACCUs this year (refer Appendix 2). These ACCUs were surrendered to the Clean Energy Regulator in Australia against Yarwun Nitrates to manage its excess emissions position.

In line with *National Greenhouse and Energy Reporting Act 2007* and our approach for accounting for carbon credits (see section ***Our unique participation in carbon markets***), we have claimed a net emissions reduction on the basis of meeting compliance.

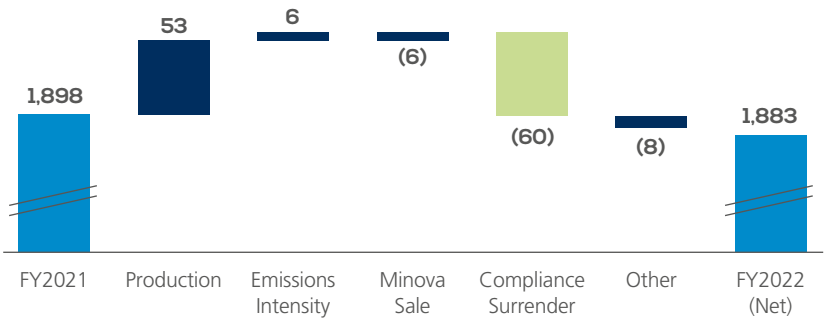
The ACCUs surrendered comprised a combination of units arising from human induced revegetation and landfill gas projects, with vintages ranging from 2016 to 2022. We are committed to sourcing high-quality carbon credits, certified to a reputable standard by an independent third party to ensure their impact is real, additional, permanent, measurable, does not cause harm and does not lead to emissions increases elsewhere.

Global Scope 1 and Scope 2 GHG emissions (Gross and Net) ($ktCO_2$-e)



Note: On page 69 of the FY2022 Annual Report, FY2019 Scope 1 emissions should read 2,092 $ktCO_2$-e.

Annual change in Scope 1 and Scope 2 GHG emissions ($ktCO_2$-e)



Note: FY2022 above shows a net emissions position following the surrender of carbon credits. See section *Transparent Accounting* for more information.

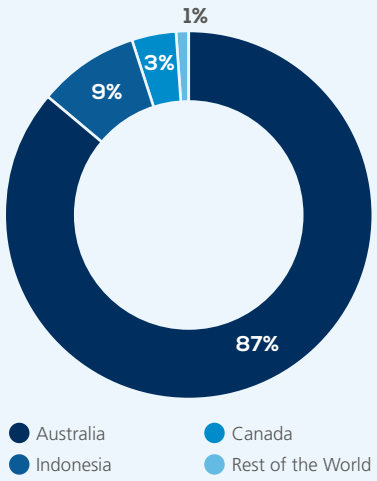
(1) Safeguard Mechanism compliance reporting year from 1 July 2022 to 30 June 2023.

TARGETS AND PERFORMANCE

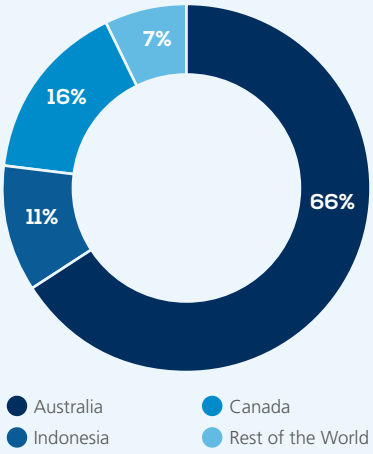
While our gross global Scope 1 and 2 GHG emissions have increased due to production growth, there has been a resultant displacement of Scope 3 emissions associated with purchased AN volumes. This adjustment between third-party sourcing and manufactured volumes has resulted in a decrease of 5.2 per cent in gross global Scope 1, 2 and 3 emissions compared to FY2021.

Emissions by country – Orica Group

Scope 1 Emissions – by Country

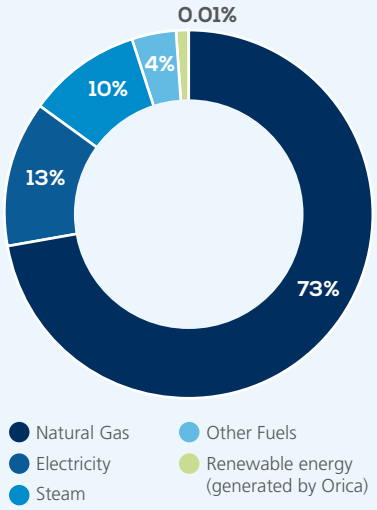


Scope 2 Emissions – by Country

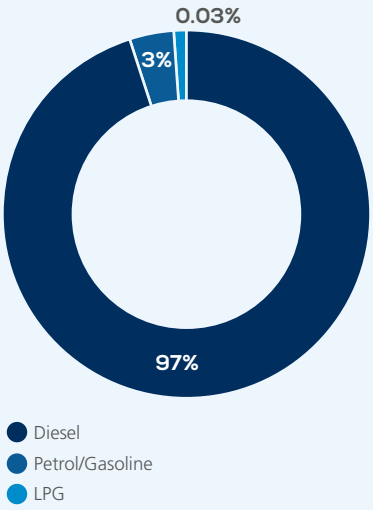


Energy consumption by source – Orica Group

Stationary energy



Transport energy



For a comprehensive breakdown of our Scope 1, 2 and 3 emissions, refer to our energy and emissions data in *Appendix 2*.

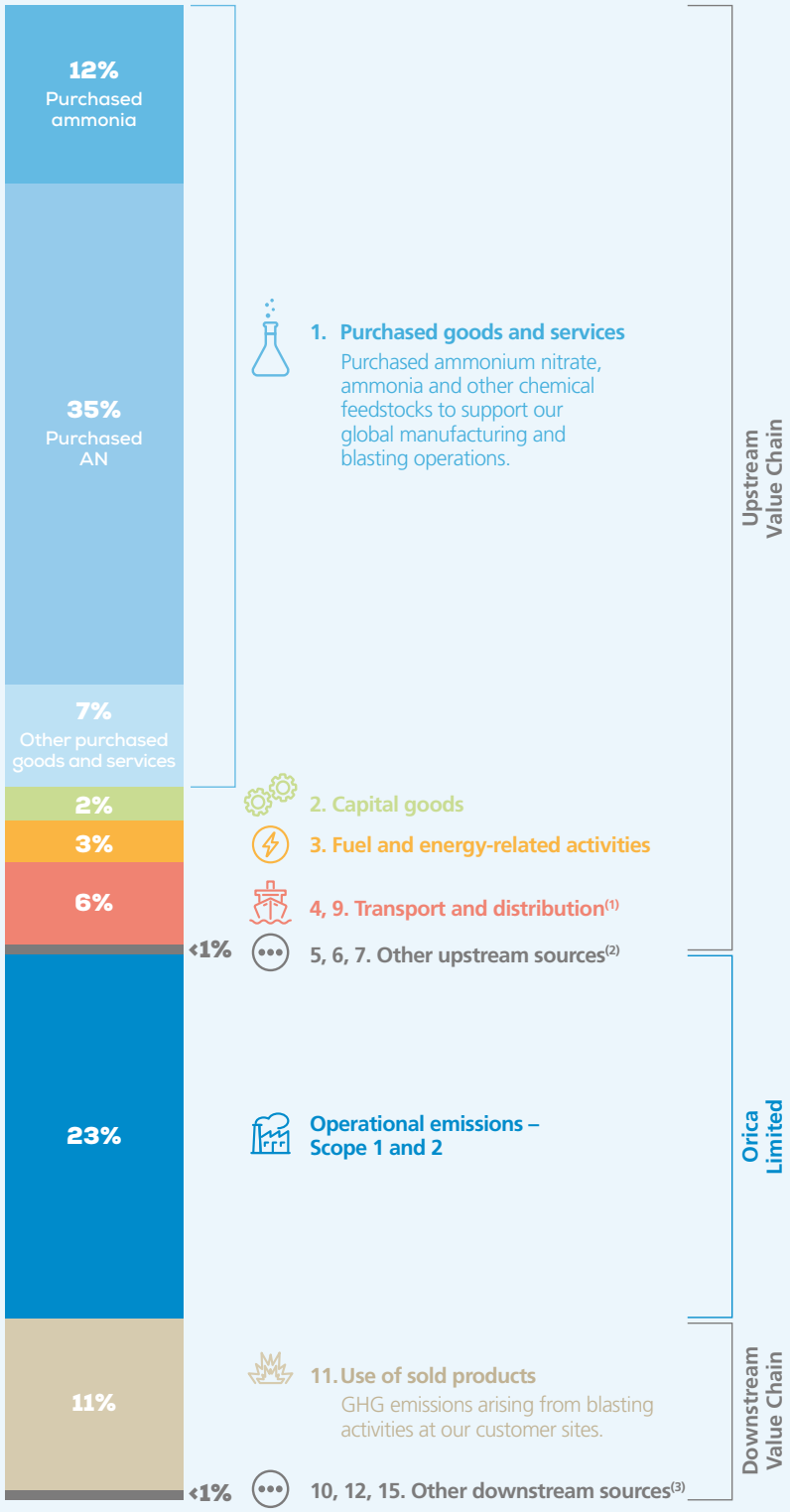
Value chain emissions

A Scope 3 emissions inventory was completed in FY2021 by estimating additional relevant and material emissions sources beyond purchased products and services. In FY2022, we continued to improve the completeness and accuracy of our Scope 3 inventory through ongoing supplier engagement. As our most material Scope 3 emissions arise from purchased chemicals to support our global blasting operations, our focus has been on our upstream supply chain, including key suppliers of AN and ammonia, and a selection of our transport providers. An initial carbon risk evaluation of our most material suppliers to complement ongoing decarbonisation planning across our value chain has been completed. In FY2023, we will bring forward a more complete value chain decarbonisation strategy and consider relevant metrics and targets.

Our global Scope 3 emissions decreased 7.2 per cent in FY2022, compared to FY2021. Although an increase was observed across most Scope 3 categories, due to higher production and sales volumes and ongoing methodology improvements, lower emissions arising from purchased AN reported within the purchased goods and services category resulted in an overall reduction. This was primarily driven by a reduction in purchased volumes as a result of changes to global AN supply chains, and the subsequent displacement of emissions from third-party supply to those arising from our own operations.

OUR SCOPE 3 EMISSIONS BY SOURCE

with a comparison to our operational emissions footprint



Shown above are relevant Scope 3 categories only. Categories 8, 13 and 14 are deemed not relevant as per GHG Protocol value chain relevance criteria testing (refer Appendix 3).

(1) Covers both upstream and downstream transport and distribution of major products purchased and sold by Orica in the reporting year.

(2) Other relevant upstream Scope 3 categories including waste generated in operations, business travel, and employee commuting.

(3) Other relevant downstream Scope 3 categories including processing of sold products, end-of-life treatment of sold products, and investments.

TARGETS AND PERFORMANCE

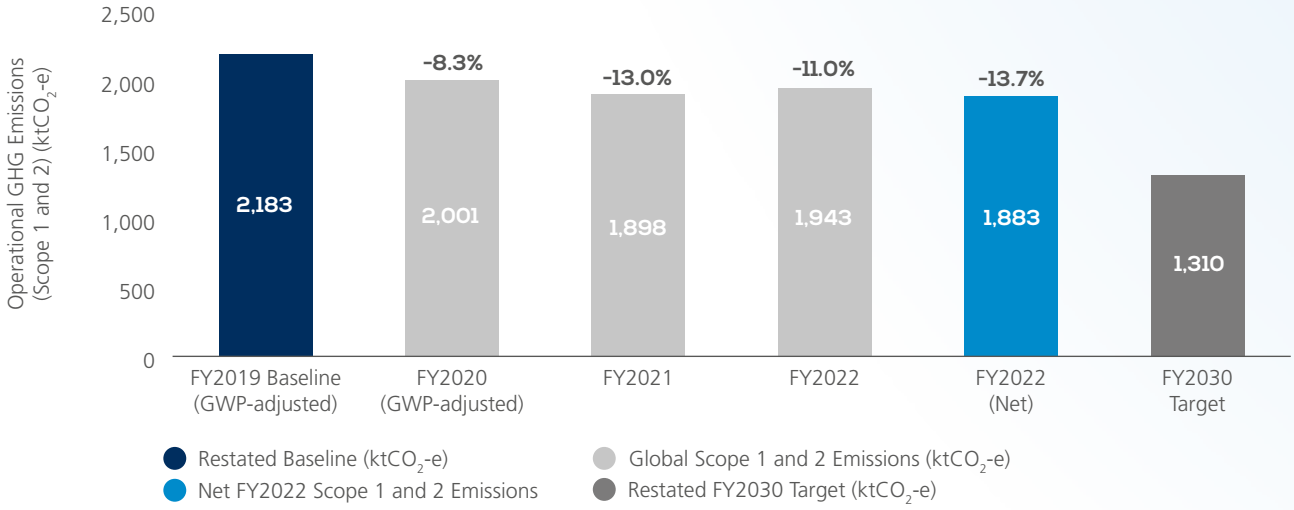
PROGRESS AGAINST TARGETS

We are committed to reducing operational Scope 1 and Scope 2 GHG emissions by at least 40 per cent by 2030, from 2019 levels. While we have reduced our absolute operational GHG emissions over the past four consecutive years, we had previously recognised that ongoing reductions were unlikely to be linear. Major decarbonisation projects require long-lead times for feasibility, engineering and final investment decisions. Installation of new technology or equipment is aligned with scheduled maintenance outages which occur infrequently, every three to five years.

In FY2022, we installed tertiary catalyst abatement at our Carseland facility, and progressed detailed engineering for the Kooragang Island Decarbonisation project, scheduled for commissioning from October 2022.

However, on a gross emissions basis, in FY2022 global Scope 1 and 2 emissions were 11 per cent below our 2019 baseline. Following the compliance surrender of 60,000 tCO_2-e in Australian Carbon Credit Units, our net emissions position for FY2022 is 1,883 $ktCO_2$-e, or 14 per cent below our 2019 baseline, consistent with our position at the end of FY2021.

Progress towards achieving absolute GHG emissions reduction target



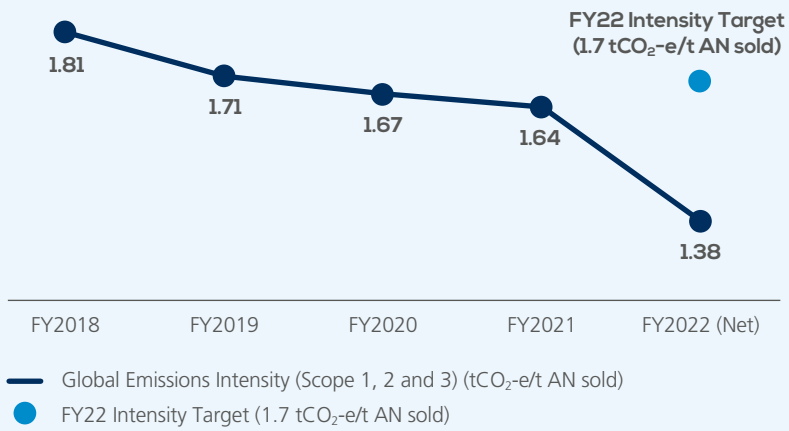
Note: FY2019 Baseline and FY2020 have been restated due to GWP changes in FY2021. Refer to page 26 of Orica's 2021 Climate Action Report.

We achieved our target for emissions intensity to remain at or below 1.7 tCO_2-e per tonne of AN sold[1].

On a net basis, GHG emissions intensity was 1.38 tCO_2-e per tonne of AN sold, 16 per cent lower than FY2021 (1.64 tCO_2-e per tonne of AN sold). This was a result of reduced Scope 3 emissions associated with lower purchased AN volumes and reduced nitrous oxide emissions from Carseland tertiary catalyst abatement.

We will continue to disclose GHG emissions intensity providing our stakeholders information on the mix of GHG emissions from purchased and manufactured AN.

Progress towards achieving emission intensity target



(1) Our target to maintain emissions intensity at or below 1.7 tCO_2-e/tonne AN sold by FY2022 does not account for our FY2021 expanded Scope 3 boundary. We maintained the current target, accounting for purchased AN and ammonia only, until its completion in FY2022. Looking ahead, we will review our approach to emissions reduction across our value chain and consider relevant metrics and targets.

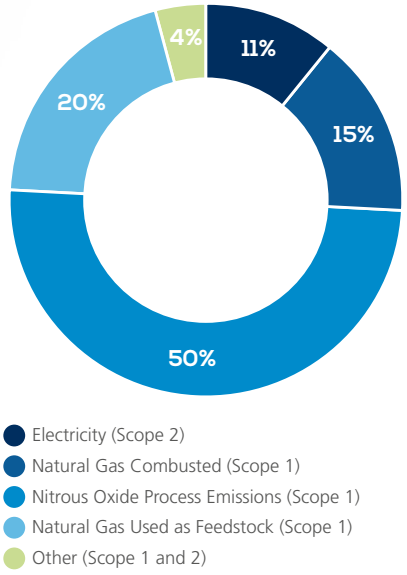
ACCELERATING OUR DECARBONISATION

The major source of GHG emissions from the production of AN is in the first stage of the process, the production of nitric acid. These emissions differ from most other emissions-intensive activities as they are primarily from nitrous oxide, which is 265 times more potent than carbon dioxide. We operate nine NAPs globally, with nitrous oxide emissions representing 50 per cent of our total Scope 1 and 2 operational emissions in FY2022.

Catalyst abatement technology solutions destroy nitrous oxide, converting it into naturally occurring nitrogen and oxygen. The technology is well suited to reducing nitrous oxide emissions from industrial and chemical process plants such as nitric acid. The most common cost-effective application is known as secondary catalyst abatement. Nitrous oxide emissions are typically reduced 75-90 per cent from unabated levels with this technology.

While opportunities exist to deploy best available tertiary catalyst technology and reduce more than 95 per cent of these emissions from unabated levels, there are currently limited incentives for chemicals producers to deploy these technologies. They derive no economic benefit in the absence of a financial penalty on emissions or a 'green premium' on lower-emissions intensive products. However, with government financial incentives and carbon market participation, the economic viability of tertiary abatement can be improved.

Global GHG emissions by source (Scope 1 and 2)

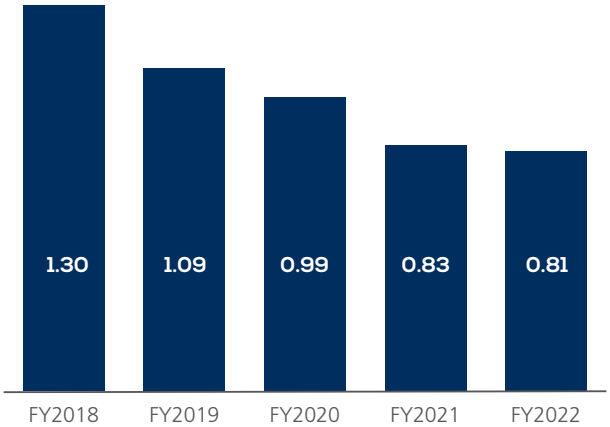


Since FY2018, we have undertaken a range of operational abatement trials. We continue to focus our decarbonisation studies and access to financial support at our continuous manufacturing facilities where we are targeting substantial reduction in our nitrous oxide emissions.

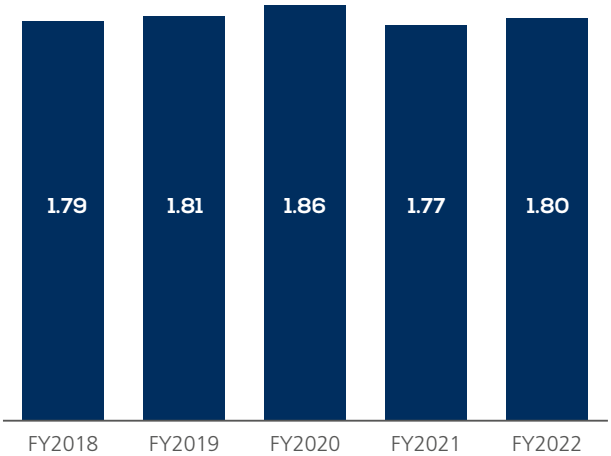
In FY2022, we:

- commenced operation of a tertiary catalyst abatement system on one NAP in Carseland, Canada. This has reduced site Scope 1 and 2 GHG intensity by 46 per cent and abated the equivalent of 69 $ktCO_2$-e in nitrous oxide emissions this year;
- commenced installation of tertiary catalyst abatement across three NAPs as part of the Kooragang Island Decarbonisation Project. The project is estimated to abate at least 0.57 $MtCO_2$-e of nitrous oxide emissions annually;
- registered the Yarwun Nitrates Decarbonisation Project under the Australian Government's Emissions Reduction Fund and subsequently secured an optional carbon abatement contract for delivery of 1.3M ACCUs; and
- continued operating secondary selective nitrous oxide catalyst abatement, where practicable, in our plants in Indonesia, Australia and Canada.

Global NAP emissions intensity (tCO_2-e per tonne of nitric acid produced[1])



Ammonia plant emissions intensity (tCO_2-e per tonne of ammonia produced[2])



(1) Scope 1 emissions (nitrous oxide only) from nitric acid manufacture per tonne of nitric acid produced.

(2) Total Scope 1 and 2 emissions from ammonia manufacturing facility per tonne of ammonia produced.

TARGETS AND PERFORMANCE

Active decarbonisation across our continuous manufacturing plants

KOORAGANG ISLAND

New South Wales, Australia

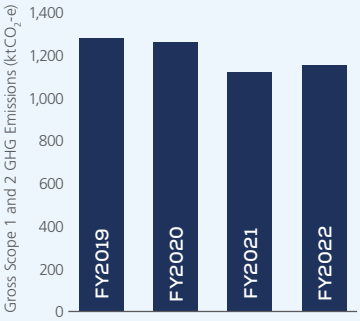
3 nitric acid
2 AN
1 ammonia

Decarbonisation:

- Installation of tertiary abatement in progress, commissioning from October 2022
- MoU with Origin Energy
- PPA with Lightsource bp for renewable electricity from 2025

4% reduction in AN intensity since 2019

Jurisdictional GHG emissions regulation: NGER



YARWUN

Queensland, Australia

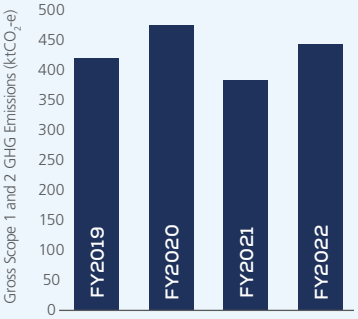
3 nitric acid
2 AN
1 sodium cyanide

Decarbonisation:

- Secondary abatement installed on one NAP
- Tertiary abatement feasibility study
- MoU with H2U – Hydrogen Utility®

2% increase in AN intensity since 2019

Jurisdictional GHG emissions regulation: NGER



CARSELAND

Alberta, Canada

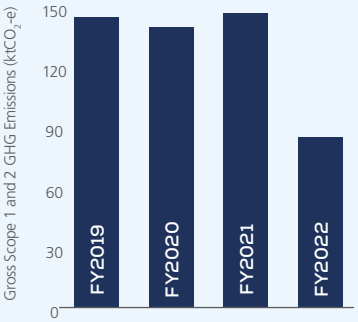
2 nitric acid
1 AN

Decarbonisation:

- Tertiary abatement installed in one NAP in November 2021
- Secondary abatement in operation on second NAP

33% reduction in AN intensity since 2019

Jurisdictional GHG emissions regulation: TIER



BONTANG

East Kalimantan, Indonesia

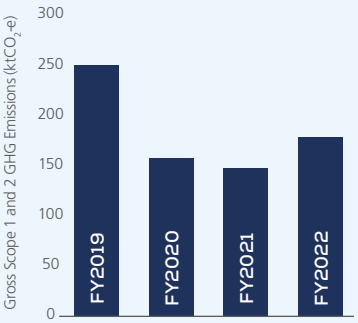
1 nitric acid
1 AN

Decarbonisation:

- Secondary abatement installed on NAP
- Tertiary abatement under investigation

37% reduction in AN intensity since 2019

Jurisdictional GHG emissions regulation: None yet



RISK MANAGEMENT

Our approach to risk management is to proactively and prudently manage our risks to ensure we operate a safe and responsible business.

Our risk management system provides a framework aligned with ISO31000:2018 Risk Management – Principles and Guidelines. This facilitates the ongoing assessment, monitoring and reporting of risks, including climate change, which could otherwise impede progress in delivering our strategic priorities.

The framework defines where an impact is deemed substantive (or material) from a financial or strategic point of view. This ensures all risks are identified, evaluated, mitigated (as far as is practicable) and reported according to the same principles of quantification in a comparable manner.

This year, our risk management system continued to evolve as we operationalised risk appetite to improve risk awareness across the business and the understanding of the risks that could have a material adverse effect on our business.

A climate change risk appetite statement was prepared in FY2021 and reviewed during FY2022. Testing of suitable key risk indicators was conducted to capture the dynamic nature of our operations and customer markets. The review process will continue into FY2023 where it will be approved, providing an informed boundary for the pursuit of our strategic goals.

A full description of our risk management approach is described in our 2022 Annual Report. Additional information is included in our CDP Climate Change Questionnaire response.

STRATEGIC RISKS

Several company-wide strategic material business risks have been identified with potentially direct climate-related physical impacts. Other impacts associated with a transitioning global economy have also been identified including changing policy and regulation, community and investor expectations, along with changes in markets and commodity demand, customer/product mix and the emergence of new technologies.

The tables shown overleaf summarise our most material[1] climate-related risks and opportunities as well as actions taken in FY2022 to manage the risk or maximise the opportunity.

(1) Orica defines substantive financial impact as being greater than $50 million cumulative (both opportunity and downside) and/or loss of key customers and license to operate in a key jurisdiction. This financial value represents a 'critical' category in our enterprise risk consequence definitions.

RISK MANAGEMENT

LEGEND

Time horizon

Short | Medium | Long

Transitional

Policy and legal | Market | Reputation | Technology

Transitional risk

Impact, type and time horizon	Description of impact, risks and opportunities	Our management response
Supply chain resilience and security	Increasing regulated carbon pricing may increase our sourcing costs due to raising prices of key inputs and services, including raw materials, gas, electricity and freight services.	– We routinely monitor carbon pricing developments across the globe which may affect upstream suppliers in our operating regions and result in increased prices. – In line with existing financial management measures, where cost increases are anticipated, these are considered as part of Orica's normal pricing models. – We measure and report on Scope 3 emissions to better understand material sources of transitions risks in our supply chain and wider value chain. – As part of our value chain decarbonisation strategy, we aim to increasingly seek and source lower emissions intensive providers which inherently would be subject to less regulated costs – conversely, these providers may also charge a premium for their lower carbon product/service.
Climate and energy policy, carbon pricing and markets	An increasing price on carbon may lead to increasing operating costs, including through higher input prices, compliance costs and insurance premiums. The introduction of trading taxes and/or barriers for high emissions intensive products has the potential to impact our import and export costs and/or our ability to import/export in some jurisdictions. The development of carbon market mechanisms and government carbon policy can provide opportunities to participate in carbon markets to support our emissions abatement strategy.	– Potential exposure to carbon policy, trade and carbon costs in our key jurisdictions is monitored on an ongoing basis. – Reducing our GHG emissions over the next decade is a pillar of our strategy for climate action and a way to circumvent transition-related climate risk. – To deliver on this and mitigate future transition risks, targets have been set to 2030, a 100 per cent renewable electricity target by 2040 and an ambition to achieve net zero emissions by 2050, supported by a decarbonisation pathway. – 84 per cent of our operational emissions are currently subject to direct emissions regulation. We continue to measure and monitor our direct (Scope 1) and indirect emissions (Scope 2 and Scope 3) and have strong data governance processes in place. In all operating regions, we are compliant with jurisdictional energy and emissions reporting legislation[1]. – We monitor likely opportunities in relation to policy developments and carbon market participation. In Australia, the Kooragang Island Decarbonisation Project, announced in FY2021, is registered to generate Australian Carbon Credit Units (ACCUs) under the voluntary Emissions Reduction Fund scheme. In FY2022, we have registered the Yarwun Nitrates Decarbonisation Project for the optional delivery of credits to the Australian Government.
Our reputation	Negative impacts to our reputation can occur if we fail to demonstrate and communicate appropriate climate action on our decarbonisation efforts and market positioning. This could impact our ability to secure financing and investment capital, our social license to operate, and our ability to attract and retain talent.	– Alternately, positioning our business to support the transition to a lower-carbon economy can bring positive stakeholder response and enhanced reputation. – In-house specialised climate change and decarbonisation resources inform our abatement strategy and implement processes to manage foreseeable and material climate-related risks and opportunities. – In FY2022, we further progressed decarbonisation initiatives to enhance our resilience to a lower-carbon future and to demonstrate real, tangible actions for decarbonisation to our industry and wider value chain.

(1) In Australia, we fulfil legislated requirements under the Safeguard Mechanism, administered under the National Greenhouse and Energy Reporting Act 2007. In Canada, we participate and report under the Technology Innovation and Emissions Reduction (TIER) Regulation.

Transitional risk

Impact, type and time horizon	Description of impact, risks and opportunities	Our management response
Changing demand for our products and services	The demand for our products and services evolves as the world transitions to a lower-carbon economy. This brings risks and opportunities. For example, as the substitution of thermal coal in power generation accelerates over the next decade, we are anticipating reduced demand from thermal coal customers in our business. Similarly, an increase in the use of steel scrap and a potential move towards electric or hydrogen-based processes in the steel manufacturing sector are expected to reduce demand for metallurgical coal in the long-term. This will impact the demand for the products and services we offer to mine this commodity. However, the development and mass adoption of new technologies such as hydrogen and electric vehicles has the potential to increase the end-use of materials produced by Orica and our customers. Increased investment in climate change adaptation and resilience measures may also lead to greater demand for quarry and construction materials, increasing the demand for our products and services targeted to these sectors.	– Our climate change scenario analysis on future commodity demand helps us explore relevant trends with the potential to impact the market demand for our existing products and services. We use a range of scenarios to ensure our strategy remains flexible and resilient under different possible futures and temperature pathways. – As a result of our scenario analysis (see section 'Portfolio analysis'), we focus on capturing growth and diversification opportunities to increase our exposure to future-facing commodities, which are projected to be in higher demand in a lower-carbon economy. – We monitor specific external signposts annually, which are designed to indicate the changes in the most-likely (base case) outcome relative to our scenarios. – The next review of our scenarios is scheduled for FY2023. – Additionally, and as informed by our scenario analysis process, we incorporate the allocated capital to our decarbonisation activities into asset impairment testing, as forecasted capital expenditure and costs. See 'Portfolio analysis' for more information.
Operational competitiveness	The development and deployment of lower-carbon technologies have the potential to impact our ability to remain competitive in our operations. If we successfully integrate these technologies to drive lower operating costs and emissions intensities or to design new lower-carbon product offerings, this can be positive. However, it can be negative if we transition at a slower pace than our competitors and customers.	– As part of our decarbonisation strategy, we have explored opportunities to achieve emissions reductions through a range of technologies, energy efficiency improvements and renewable energy initiatives at our manufacturing sites. This analysis allows us to confidently set evidence-based emissions reductions targets and a credible ambition for net zero emissions by 2050, providing a pathway forward to improve our operational competitiveness. – This year we continued exploring other avenues for decarbonisation and transition, establishing industry partnerships to explore green hydrogen and ammonia technology at some of our key Australian facilities in the major industrial regions of the Hunter Valley (NSW) and Gladstone (QLD). – We progressed decarbonisation planning across our value chain by conducting carbon risk and emissions profiling of our most material suppliers. Profiling will be expanded across our broader supplier base. Carbon risk considerations will also be embedded into our strategic sourcing decisions. – Since 2020, we have been an active founding member of the Australian Industry Energy Transitions Initiative (ETI), a cross-industry collaboration group analysing decarbonisation opportunities in 'hard-to-abate' industries. Our participation and active contributions to the ETI shows our commitment to decarbonisation and mitigating foreseeable climates risks to our industry and business.
Changing societal expectations	Changing societal expectations for delivering positive ESG performance is impacting the global resources sector. Market and policy momentum behind ESG continues to gather pace, particularly on climate change. Alongside climate, biodiversity, other environmental concerns and social issues (such as diversity, equity and inclusion and worker well-being) are poised to remain in the spotlight. Failure to respond to shifts in societal and investor expectations threatens our ability to achieve our objectives and meet stakeholder expectations. Societal standards for businesses to act responsibly are increasing. Failing to anticipate or respond could see increased regulatory burden, supply and/or operational disruption, damaged stakeholder relationships and reputation.	– We are committed to addressing material sustainability issues, including action on climate change, by providing transparent disclosure on our performance. – We are engaging in regular, meaningful and inclusive dialogue with our stakeholders. Our collaborative, shared value approach helps us anticipate, assess and address risks, opportunities and impacts relating to increasing societal expectations. – In FY2022, we converted $1.3B of existing bank debt facilities to sustainability-linked loans including targets for emissions reductions among other sustainability metrics. This increases accountability for improving performance and a financial incentive to deliver on climate action.

RISK MANAGEMENT

LEGEND

Time horizon

Short | Medium | Long

Physical

Acute | Chronic

Physical risk

Impact, type and time horizon	Description of impact, risks and opportunities	Our management response
Worker health and safety	Acute (extreme weather events) and chronic (increasing temperatures and number of hot days, increased prevalence of tropical diseases, etc.) physical climate change has the potential to increase health and safety risks for our employees and contractors, impacting productivity and absenteeism rates and our ability to attract and retain talent.	– Nothing is more important than the health and safety of our people and preventing illness and injury, including due to heat stress and other weather extremes. – Management of this risk is governed by our Safety, Health and Environment policy and our SHES management systems. – Under our SHES Group Standards, sites are required to monitor and maintain a safe working environment for employees. This includes monitoring workers and ensuring they are fit to work, and heat stress monitoring at our major operating facilities when required by seasonal conditions. – In FY2023, we plan to review relevant findings from our completed FY2022 global physical risk assessment for incorporation into our SHES management systems.

Supply chain resilience and security	Increased frequency and/or intensity of extreme weather events (cyclones, floods, bushfires, etc.) have the potential to disrupt our supply chain, impacting our ability to maintain production levels and service customer demand.
	Changes in the supply and demand dynamics of critical inputs may also impact our ability to secure our sourcing needs while preserving cost-competitiveness. For example, the prospects of ammonia being increasingly used as a carrier for hydrogen may impact the demand and cost profile for ammonia.
		– The disruption of our supply chain is a material operational risk. We have:
		  – robust supplier onboarding processes that consider the supplier's geographical exposure to extreme weather events
		  – assigned managers to our critical suppliers to increase awareness on issues (including climate-related) that may have the potential to impact our supply chain and developed mitigation actions where necessary
		  – alternative sources of supply for critical goods such as ammonia and ammonium nitrate
		  – safety stocks at our sites to increase adaptability and ensure production continuity
		  – relationships with multiple global shipping companies and evaluations of ports and shipping routes to increase the resilience of our sea freight services.
		– In FY2022, we completed a global physical risk assessment of our assets, operating locations, major customer sites and critical ports to inform the physical climate risks posed over three temperature scenarios (RCP 2.6, RCP 4.5 and RCP 8.5) till 2030 and 2050.
		– The results of this analysis will inform further actions in FY2023 for major assets, operating regions and our supply chain

Asset integrity and production continuity	Increased frequency and/or severity of extreme weather events (flooding, storm surges, winds, bushfires, etc.) have the potential to damage our assets and/or interrupt our ancillary services. This could lead to operational disruptions, impacts to planned production levels and increased repair costs. More frequent and prolonged droughts and changes in rainfall patterns may lead to constrained water supply in areas where we operate, impacting the production capacity and environmental obligations of our manufacturing processes. Increasing temperature extremes may also result in reduced performance, reliability or integrity of our plant equipment.	– In FY2018, a physical climate risk assessment for several of our global manufacturing assets was undertaken to improve understanding of our exposure to natural perils and key potential physical climate change impacts. At the time, our current risk to sites was deemed low with the existing controls in place appropriate for the short to medium term. However, as climate-related risks are dynamic, regular assessment will ensure we continue to appropriately manage any risks to our asset integrity and production continuity. – Regular asset level risk assessments of key manufacturing locations are conducted independently by Orica's insurers. The purpose of these assessments is to identify potential risks which could result in physical loss or damage to Orica assets and resultant business interruption. The scope of the insurer's assessment includes climate-related risks and recommended controls to mitigate these risks. The results of these assessments are shared with site level managers and SHES. – Further insights from the completed FY2022 global physical risk assessment (see Supply chain resilience and security above) will inform further actions to better understand physical climate risks at the asset level, inform next steps for higher resolution assessments and tailored risk mitigation and adaptation responses where required.

RISK MANAGEMENT

REGIONAL RISK PROFILES

In FY2021, a deep-dive regional risk assessment against each of the identified climate-related risks was initially conducted for the Australia, Pacific and Asia (APA) region. This allowed us to:

- assess inherent risk at an operations level;
- identify regional causes and impacts;
- articulate regional controls and begin assigning regional risk owners; and
- further embed climate change-related risks into regular risk management routines and procedures covering APA operations.

The assessment indicated the highest inherent risk exposures in APA relate to energy markets and transition, and asset disruption from extreme weather or loss of water. This demonstrated our potential exposure to the physical impacts of climate change.

The APA regional risk assessment has informed our approach for embedding climate risk into the regional businesses in the most efficient manner. We plan to extend this process and methodology to additional operating regions, to inform priority actions within each.

PHYSICAL RISKS

Physical climate risks will increase in prevalence as global temperature rise. Orica is increasing its understanding of acute and chronic physical risks and the financial impacts to our business.

The impacts of floods are already being experienced. Heavy rainfall and floods on the east coast of Australia earlier this year caused a temporary halt/reduction of mining activity on customer sites, resulting in slowed demand for Orica's services.

In FY2022 we completed a global physical risk assessment of our assets, operating locations, major customer sites and critical ports to inform the physical climate risks posed over three temperature scenarios until 2030 and 2050 (refer case study overleaf).

Orica also works closely with our lead property insurers, who provide their own independent physical risk assessments of our key sites. The insurer works directly with site managers to understand risks and then provide the findings in site-specific reports, along with recommended mitigation measures to implement. The insurer analysis is complementary to our own internal assessments and used to increase our understanding of physical risks and to inform management actions across regions and sites.

RISK MANAGEMENT

In FY2022 we completed a global physical risk assessment of our assets, operating locations, major customer sites and critical ports

Global physical climate risk assessment

METHODOLOGY

The assessment was completed through a strategic collaboration with S&P Global Trucost.

Methodology variables	Description
Sites assessed	104 unique site locations were analysed in the assessment including: – all Orica continuous and discrete manufacturing sites; – key customer sites by major commodity; and – critical ports in our global supply chain.
Climate hazard indicators analysed	– Hurricane – Wildfire – Heatwave – Coldwave[1] – Flood – Water stress – Sea level rise
Time horizons considered	2030 to 2050 (compared to a 2020 baseline)
Temperature scenarios incorporated	– **High Climate Change Scenario (RCP 8.5):** Continuation of business-as-usual with emissions at current rates. This scenario is expected to result in warming in excess of 4 degrees Celsius by 2100. – **Moderate Climate Change Scenario (RCP 4.5):** Strong mitigation actions to reduce emissions to half of current levels by 2080. This scenario is more likely than not to result in warming in excess of 2 degrees Celsius by 2100. – **Low Climate Change Scenario (RCP 2.6):** Aggressive mitigation actions to halve emissions by 2050. This scenario is likely to result in warming of less than 2 degree Celsius by 2100.

(1) A coldwave is the occurrence of extreme cold relative to local climatic conditions.

RISK MANAGEMENT

FINDINGS

A note on the findings: the global physical risk assessment only considers the level of unmitigated risk – it does not consider measures currently in place at sites to mitigate the physical risk. The actual risk level may be lower based on any existing or planned internal risk mitigation measures at sites.

It was found that at the aggregate group level, our operational sites on average are exposed to moderate physical risks, across all three temperature scenarios.

- **Until 2030**: the greatest physical climate impacts were found to be from water stress, followed by coldwaves and then wildfire, heatwaves and less so from river flood, sea level rise and hurricanes.
- **Until 2050**: water stress remained as the dominant impact in the assessment like in 2030, followed by wildfire and then coldwaves, heatwaves and less so from river flood, sea level rise and hurricanes.

WATER STRESS IN FOCUS

Under a business-as-usual scenario (BAU)[1], approximately 50 per cent of Orica sites could potentially face a high or medium level of water stress by 2030. Together with population growth and urban pollution pressures, competition for water resources is increasing globally. In response, we are increasing our focus on optimising our water use.

We are working to reduce our dependency on potable water by increasing the efficiency with which we use water and maximising our use of recycled water, wherever possible. Our aim is to limit the impact on our host communities and ecosystems and increase resilience to water stress.

This year, we identified and evaluated potable water reduction initiatives across our major consuming global sites. Our approach to measurement and metrics was updated (refer 2022 Annual Report).

We also converted $1.3 billion of existing loan facilities to sustainability-linked loans. The transaction included commitments to reduce potable water intensity. For further information refer to our 2022 Annual Report.

NEXT STEPS

This assessment has improved our understanding of physical risk exposures across our operations.

The results of this global analysis will inform further actions for major assets, operating regions and our supply chain in FY2023. This includes developing business cases for identified potable water reduction initiatives.

Next steps involve understanding site-level physical risks of key operations in more detail as well as assessing risk mitigation measures currently in place.

(1) Ranked by potable water consumption volume in FY2021. Data sourced from WRI Water Risk Atlas, BAU Scenario. Water stress is an indicator of competition for water resources and is defined informally as the ratio of demand for water by human society divided by available water.

GOVERNANCE

Climate change is a multi-faceted global issue presenting challenges for all aspects of society – governments, industries, businesses and communities – and the natural biosphere. As a global leader in mining and civil blasting, we have a fundamental role to play in addressing climate change.

Consistent with our Climate Change Policy, we accept that human activities are influencing global warming. We also support the primary objectives of the Paris Agreement to keep global temperature rise to well below 2°C and pursue efforts to constrain warming to 1.5°C.

The management of foreseeable and material business risks, including climate-related financial risks, requires strong corporate governance and managerial oversight. Our expectations for all employees and contractors are outlined in Our Charter, Business Code of Conduct and Climate Change Policy, including responsible business practices and our decisions and actions to address climate change.

CLIMATE CHANGE GOVERNANCE FRAMEWORK

BOARD OF DIRECTORS

Non-executive Directors, Managing Director & CEO
Strategy, Performance, Risk Management, Culture

Safety and Sustainability Committee
SHES, sustainability and climate change performance

Innovation and Technology Committee
Technology-related strategy, risk and opportunity

Board Audit and Risk Committee
Risk management

Human Resources and Compensation Committee
Remuneration policy

EXECUTIVE COMMITTEE

Managing Director & CEO
Board-appointed individual responsible for climate change

Chief Development and Sustainability Officer
Responsible executive sponsor for climate change and sustainability including strategic planning, mergers and acquisitions and government relations

Chief Financial Officer Business planning, risk management and capital investment

Chief Technology Officer Sustainable product solutions, Clean Technology Roadmap

Regional Presidents Regional decarbonisation projects and sustainability action plan

President – SHES, Discrete Manufacturing and Supply Value chain decarbonisation

CLIMATE CHANGE COMMITTEE

Chaired by **Chief Development Officer & Chief Sustainability Officer**
Responsible for governance and decision-making of decarbonisation initiatives and climate risk management

Corporate Affairs Sustainability

Regions Operations Manufacturing

Customer Supply Chain/ Procurement

OUR PEOPLE

Regions and sites
Generate ideas and execute projects

GOVERNANCE

Key aspects of our governance framework and practices are provided in our FY2022 Corporate Governance Statement. More detailed climate governance disclosures can be found in our CDP Climate Change Questionnaire response.

ORICA BOARD

Climate change is a material governance and strategic risk routinely overseen by the Orica Board.

Climate-related topics are considered during Board strategy discussions, strategic risk management oversight and monitoring, policy implementation and performance updates. The Board monitors the implementation of our Climate Change Policy, to support the execution of the business strategy.

Climate change strategic risk updates are provided to the Board annually, with climate risk deep dives provided every two years.

In FY2022, the Board:

- considered our planned responses following strategic and financial analysis with reference to material business risks (including climate change, commodity demand and energy markets) and the outcomes of scenario analysis;
- considered ESG trends, shareholder ESG feedback in Orica's business planning and progress to mitigate identified risks and capture new product and customer opportunities;
- approved Orica's target to source 100 per cent renewable electricity by 2040; and
- considered updates on emerging technologies for decarbonisation including hydrogen produced from renewable energy and green ammonia.

Board skills and competencies

In FY2021, the Board approved the inclusion of Safety and Sustainability as an additional skill category. This reflects the importance of integrating material sustainability and climate change risks and opportunities into strategic decision-making to create sustainable value.

Orica's Managing Director and Chief Executive Officer (CEO) is responsible for climate change as part of directing and promoting the profitable operation and development of the Orica Group, consistent with the primary objective of enhancing long-term shareholder value. This includes managing foreseeable and material financial risks, including climate change. Our Managing Director and CEO is a director of Orica Limited.

Further information on the skills and competencies of the Orica Board is provided in our FY2022 Corporate Governance Statement.

Safety and Sustainability Committee

The Safety and Sustainability (S&S) Committee assists the Board in the discharge of its responsibilities allowing detailed consideration of complex sustainability issues. The Committee also oversees our Safety, Health, Environment and Security (SHES) management framework, systems and performance, including climate change considerations across these aspects. The adequacy of our SHES and sustainability strategies and updates on our performance are monitored at least quarterly. Our climate-related disclosures, including metrics and targets, are reviewed and endorsed by the S&S Committee.

Board Audit and Risk Committee (BARC)

The BARC assists the Board with assessing the adequacy and integrity of our financial and operating controls, providing oversight of risk management systems and compliance with legal requirements. The BARC reports twice yearly on our exposure to material strategic and operational risks, which are monitored for changes, along with the controls and plans to manage these risks.

The BARC reviews a sustainability materiality assessment each year, including advice on emerging risks, new opportunities and processes for verifying the integrity of climate-related data and disclosures.

In FY2022, the BARC:

- considered strategic risk updates on climate change, commodity demand and energy markets among other climate-related risks;
- evaluated the approach and assumptions made about climate risks in the assessment of asset impairment testing. In FY2022, capital outflows required to meet Orica's 2030 GHG emissions reduction target and outcomes of scenario analysis were incorporated in asset impairment tests; and
- monitored progress on aligning our climate action and disclosures against the recommendations of the TCFD.

Innovation and Technology Committee

The Innovation and Technology Committee assists the Board with matters of innovation and technology, information technology strategy and execution, and technology-related risk.

Existing and future trends in technology that may affect the industries in which we operate are considered. The role of digital technologies in quantifying the value of optimised blasting delivered at every stage of the mining value chain, is an increasing area of focus. This includes measuring downstream mining productivity benefits, reduced energy consumption, cost and emissions.

EXECUTIVE COMMITTEE

Our Managing Director and CEO and the Executive Committee are responsible for directing and promoting the profitable operation and development of the Orica Group. Key management decisions are made in accordance with their delegated authority, including the governance of climate-related risks and opportunities.

During the year, our Chief Development and Sustainability Officer assumed responsibility for developing and overseeing Orica's sustainability and climate change strategy[1]. A dedicated global sustainability team reporting to the Chief Development and Sustainability Officer, advises the Executive Committee, Board committees and the Board on our climate response.

Executive Climate Change Committee

Strong governance is essential for managing our approach to climate change and delivering on our commitments. This year, we established the Climate Change Committee (CCC) to govern and take decisions which evolve and improve our climate change performance.

The Committee was chaired by Orica's Chief Financial Officer and provided oversight and alignment on:

- our enterprise-wide climate change strategy;
- GHG emissions performance and meeting existing ambitions, commitments and targets;

(1) Until the end of FY2022, our Chief Financial Officer (CFO) was the responsible executive for our climate change strategy (see Executive Committee for more).

GOVERNANCE

Links between climate change and remuneration for the CEO, Executive Committee and employees are in place

- monitoring of global climate change external developments and the energy transition underway;
- technical assessment of emerging opportunities across our operations, customers and supply chain;
- supporting the Corporate Affairs and Sustainability function on setting and delivering climate-related corporate policies and goals; and
- endorsing strategic plans, financial investments (in accordance with delegated authorities) with, and roadmaps to progress implementation of climate-related initiatives.

Looking ahead, Orica's Chief Development and Sustainability Officer will chair the CCC. This reflects Orica's progress to further institutionalise sustainability into corporate strategy.

EXECUTIVE REMUNERATION

Our remuneration framework is linked to the drivers of our business strategy, helping to create long-term success for shareholders. Strategic drivers are reflected in short-term incentive (STI) and long-term incentive (LTI) performance measures linking executive incentives to actual performance. Our remuneration policy is managed and overseen by the Human Resources and Compensation Committee.

In FY2021, the Board approved the strengthening of links between climate change and remuneration for the CEO, Executive Committee and employees for implementation from FY2022 onwards. Performance based on progress towards achieving our targets to reduce operational emissions is incentivised and includes a climate change metric with a 10 per cent weighting. Executive Committee members also have a sustainability-based metric within the strategic component of their STI scorecard, some of which include other climate-related metrics incentivising improved performance on managing climate risks and capturing new opportunities.

Our FY2022 remuneration results, including climate change incentivised performance, can be found in our Remuneration Report which begins on page 99 of the Annual Report.

RESPONSIBLE ADVOCACY AND ENGAGEMENT

Investor engagement

We continue to engage proactively and transparently with our shareholders and through our sustainability dialogue initiatives. Further information is outlined adjacent and in the stakeholder engagement section of our 2022 Annual Report.

Climate Action 100+
Global Investors Driving Business Transition

Climate Action 100+ (CA100+) tracks the progress of companies against several key indicators through regular engagement, progress reporting and benchmarking.

The positive dialogue maintained this year with Orica has been acknowledged by our lead investor, Australian Retirement Trust (ART). ART's latest *Sustainable Investment Report* published on 31 October 2022, highlights Orica's progress in relation to the setting of a net zero emissions ambition by 2050 covering Scope 1 and 2 GHG emissions and its most material Scope 3 emissions; a reduction in Scope 1 and 2 GHG emissions since 2019; and the setting of a credible roadmap to achieve the targets in place by prioritising technology solutions, collaborating with suppliers and customers, and providing better disclosure of performance against targets in line with the Task Force on Climate-related Financial Disclosures requirements.

We anticipate our ongoing engagement with CA100+ will further improve investor understanding of our climate strategy and progress towards meeting our commitments.

Advocacy

We actively engage in advocacy on behalf of our industry. Where we participate in regional and national policy development, we advocate in line with our Climate Change Policy.

We support efforts by governments to reduce economy-wide greenhouse gas emissions and agree that the industrial sector has a role to play. In FY2022, governments within Orica's operating regions called for submissions (via open consultation) on newly proposed legislation and reviews of existing policy.

We submitted commercial-in-confidence responses to a range of public policy reviews including:

Australia	– Independent Review of Australian Carbon Credit Units, Aug – Sep 2022
	– Safeguard Mechanism Reform, Aug – Sep 2022
	– Safeguard Crediting Mechanism, Oct 2021
Canada	– Technology Innovation and Emissions Reduction Regulation Review, Jun – Aug 2022

In Australia, we continued our engagement with the Clean Energy Regulator's Corporate Emissions Reduction Transparency (CERT) pilot, a proposed voluntary initiative disclosing progress on emissions reduction targets under the *National Greenhouse and Energy Reporting Act 2007*:

- in FY2021, we were a member of the co-design working group for the CERT, providing feedback on the practicality and benefits of the proposed initiative;
- in FY2022, we voluntarily opted-in to disclose under the CERT pilot, while engaging with the Clean Energy Regulator during testing of the pilot scheme; and
- although there are some challenges for the CERT for a global 'hard-to-abate' manufacturer like Orica, in FY2023, we plan to continue our engagement to encourage greater transparency and comparability for company emissions reductions targets and goals.

Industry associations

We are a member of a range of business and industry associations around the world.

Industry plays an important role in helping formulate effective policy frameworks, standards and practice to facilitate a lower-carbon economy.

There can be a wide range of views within the membership of each association and as members, we may not always agree with every position or approach. This is especially the case when the association's membership is large and the mandate is broad, covering a wide range of issues.

Our approach is governed by an internal Group Standard which outlines business requirements in relation to memberships aligning to business needs, internal approval pathways and responsible advocacy. It requires that representations to stakeholders are consistent with any Orica Group positions on regulatory or government-related issues.

Along with our stakeholders, we expect strong governance and transparency pertaining to the climate lobbying positions of the membership organisations of which we are a member.

Industry association review 2022

This year, we continued to review our key industry associations to identify any material differences between the climate change and energy positions we hold, and those held by our relevant industry associations.

An independent external review was organised to provide recommendations in light of new internal positions and new international guidance on responsible climate lobbying[1, 2]. The review was based on the publicly available information from our industry associations.

Findings identified no material misalignments and that the majority of the reviewed associations were either mostly or partially aligned with our climate change and energy positions. If misalignment is deemed a material issue and if it cannot be addressed through constructive engagement, Orica would further assess whether the membership should continue.

(1) Methodology for Assessing Corporate Climate Policy Engagement as conducted by InfluenceMap and provided to Climate Action 100+ for the Net Zero Company Benchmark 2022 Assessments

(2) The Global Standard on Responsible Climate Lobbying

GOVERNANCE

Shown below are our key industry associations, who have outlined a position on climate change and energy. Also mapped is Orica's involvement and engagement per association.

Industry association	Geography	Membership type	Orica's involvement
Australian Industry Energy Transition Initiative (ETI)	Australia	Founding Member, Steering Committee Member	– Participation in research workshops – Participation and feedback on reports and analysis
Australian Industry Group (Ai Group)	Australia	Corporate Member	– Participation in policy workshops on energy and climate – Contribution in feedback on government submissions
Carbon Market Institute	Australia	Corporate Member	– Participation in strategic projects – Participation in workshops on climate and energy policy, and carbon markets – Contribution in feedback on government submissions
Chemistry Australia	Australia	Corporate Member	– Board position – Participation in strategic projects – Contribution to submissions with a focus on gas market reform, circular economy, climate change and professional industry standards
Energy Users Association of Australia	Australia	Corporate Member	– Board position – Participation in policy workshops on electricity and gas – Contribution to submissions
Fertilizer Canada	Canada	Associate Member	– Participation in strategic projects – Participation in Provincial and Federal working group – Contribution to submissions with a focus on clean fuel standards, climate change, energy and GHG emissions
Minerals Council of Australia	Australia	Associate Member	– Participation in strategic projects of relevance
NSW Minerals Council	Australia	Associate Member	– Participation in strategic projects of relevance
The Chamber of Minerals & Energy of Western Australia	Australia	Ordinary Member	– Participation in strategic projects of relevance including the Work Health & Safety (WHS) Committee, COVID-19 WHS Working Group and the Diversity and Inclusion Reference Group
The Fertilizer Institute	USA	Member	– Participation in strategic projects of relevance
World Coal Association	International	Corporate Member	– Participation in events with key customer base

Going forward, we commit to reviewing our list of key industry association memberships annually.

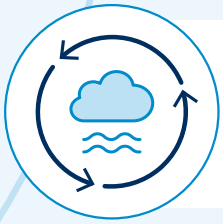
KEY PRIORITIES FOR THE YEAR AHEAD

A summary of key priorities for FY2023 are shown below.

Continued execution of tertiary abatement catalyst technology: Important milestones were achieved by the Kooragang Island Decarbonisation Project in FY2022 with the delivery of three tertiary abatement reactors in August 2022 and installation proceeding at Nitric Acid Plant No. 1 in September 2022. Deployment across the remaining two nitric acid plants will occur in FY2023.

Develop value chain decarbonisation strategy: progress planning and examine relevant metrics and opportunities to set Scope 3 commitments.

Progress industry partnerships and collaborations: continue working with industry partners to better understand green hydrogen and green ammonia precincts in key Australian industrial hubs.



Climate risk management and ongoing process embedment: continue to strengthen our management of climate risk and opportunities, including to conduct the next iteration of scenario analysis, continue to embed the application of shadow carbon pricing in our strategic and financial planning and better understand site-specific physical climate risks and responses.

Carbon credits: develop a carbon market strategy to guide our future approach and participation in carbon markets.

DEFINITIONS AND GLOSSARY OF TERMS

1.5°C world	According to the Intergovernmental Panel on Climate Change, knowledge-base and assessment approaches used to understand the impacts of 1.5°C global warming above pre-industrial levels and related global greenhouse gas emission pathways, in the context of strengthening the global response to the threat of climate change, sustainable development and efforts to eradicate poverty.
4D™	Bulk explosives technology.
ACCU	Australian Carbon Credit Unit, the name of carbon credits generated in the Australian carbon market. See definition for 'carbon credits' for more information.
Ambition	Refers to a goal we are aiming to achieve, have an indicative pathway but intend to better understand the delivery prior to committing to make it a target.
AN	Ammonium nitrate (AN) is an industrial chemical commonly used in fertilisers and as a commercial explosive for quarrying and mining. AN is typically produced as small porous pellets, or "prills". It is one of the world's most widely used fertilisers and also the main component in many types of commercial explosives. In explosives, its use is critical as an oxidising agent in the explosion reaction. Orica manufactures AN at our four continuous manufacturing plants and where required sources it from third parties across our operating regions, for use in our blasting and drilling services.
Avatel™	Avatel™ is a semi-automated explosives delivery system.
Business as usual (BAU)	The projected impact under a baseline scenario in which no additional mitigation policies or measures are implemented beyond those that are already in force, legislated or planned to be adopted.
Carbon	At times used instead of greenhouse gases.
Carbon credit	A carbon credit represents GHG abatement activities which have occurred from carbon credit projects – that is specific projects with the aim to avoid or sequester GHG emissions from the atmosphere. Carbon credit projects create eligible carbon credit units which have been measured, verified and assigned a certificate in a registry for trading in carbon markets. One carbon credit unit represents one tonne of carbon dioxide equivalent (tCO_2-e) stored or avoided by a carbon credit project. Carbon credits are commonly referred to as 'carbon offsets' in markets.
CCUS	Carbon capture, utilisation, and storage.
CDP	CDP is a not-for-profit charity that runs the global disclosure system for investors, companies, cities, states and regions to manage their environmental impacts. Orica responds to the annual Climate Change Questionnaire.
Cyclo™	Cyclo™ is a containerised, automated used-oil recycling service that enables the manufacture of quality ANE directly at the customer's site using oil recycled from mine equipment.
Environmental, social, and corporate governance (ESG)	ESG is a set of non-financial standards and frameworks for a company's operations that lead to corporate responsibility and sustainability outcomes. Investors are growingly assessing their portfolios based on ESG criteria, to identify material risks and/or growth opportunities.
Financial year	For Orica this is an accounting year ending on 30 September. Also known as a fiscal year.
Future-facing commodities	Includes copper, nickel, lithium, cobalt and other metals and minerals. As much of the world continues to move towards an energy transition, demand for future-facing commodities will grow. These commodities are crucial to the manufacture of low emissions technologies that enable a transition such as batteries for electric vehicles (e.g., nickel, lithium, cobalt), solar panels (e.g. copper, silicon) and wind turbines (e.g. rare earth materials, copper) for renewable energy. To achieve the goals of the Paris Agreement, production and supply of these commodities will need to scale and increase at pace.
GHG (Greenhouse gases)	Gases which absorb and re-emit infrared radiation, thereby trapping heat in Earth's atmosphere. Includes carbon dioxide (CO_2), water vapor, methane (CH_4), nitrous oxide (N_2O), hydrofluorocarbons (HFCs), perfluorocarbons (PFCs), sulphur hexafluoride (SF_6), and nitrogen trifluoride (NF_3). The GHG applicable to Orica's operations are CO_2, CH_4, and N_2O.
GHG Protocol	The GHG Protocol supplies the world's most widely used greenhouse gas accounting standards, which inform multiple jurisdictional regulatory emissions accounting and reporting frameworks, voluntary corporate reporting standards and product lifecycle greenhouse gas accounting. Orica uses the Corporate Accounting and Reporting Standard as well as the Corporate Value Chain (Scope 3) Standard.
GJ	Gigajoule, a unit of measurement of energy consumption.
Green hydrogen	Hydrogen produced by splitting water into hydrogen and oxygen using renewable electricity
Green ammonia	Green hydrogen and nitrogen are reacted together at high temperatures and pressures to produce ammonia (Haber-Bosch process)
Gross GHG emissions	Reported GHG emissions in a reporting period (Orica financial year) prior to applying claimable emissions reductions or surrenders from carbon credit units.
GWP (global warming potential)	Factors describing the radiative forcing impact (degree of harm to the atmosphere) of one unit of a given greenhouse gases relative to one unit of CO_2. The factors convert values into tCO_2-e, to allow comparison between greenhouse gases inventories.

DEFINITIONS AND GLOSSARY OF TERMS

IPCC (Intergovernmental Panel on Climate Change)	The IPCC is an intergovernmental body of the United Nations responsible for advancing knowledge on human-induced climate change. It provides policymakers with regular scientific assessments on climate change, its implications and potential future risks, as well as putting forward adaptation and mitigation options. Through its assessments, the IPCC determines the state of knowledge on climate change.
kL	Kilolitres.
kt	Kilotonnes.
$ktCO_2$-e	Kilotonnes of carbon dioxide equivalent.
Material	In the context of the International Integrated Reporting <IR> Framework, a matter is material if it could substantively affect the organization's ability to create value in the short, medium and long term. The process of determining materiality is entity specific and based on industry and other factors, as well as multi-stakeholder perspectives.
Mt	Megatonnes.
NAP	Nitric Acid Plant.
Net GHG emissions	Reported GHG emissions in a reporting period (Orica financial year) after applying claimable emissions reductions or surrenders from carbon credit units. Includes generated carbon credits which have not been surrendered but sold on to a third party or banked in a carbon credit registry.
Net zero	Net zero refers to achieving an overall balance between greenhouse gas (as defined in this Glossary) emissions produced and greenhouse gas emissions taken out of the atmosphere.
NGER	National Greenhouse and Energy Reporting Act 2007 (Federal Government, Australia).
Paris Agreement	Convened by the United Nations Framework Convention on Climate Change (UNFCCC), the Paris Agreement is a legally binding international treaty on climate change. It was adopted by 196 Parties at COP 21 in Paris, on 12 December 2015 and entered into force on 4 November 2016.
Paris Agreement goals	The central objective of the Paris Agreement is to avoid dangerous climate change by limiting global warming to well below 2°C and pursuing efforts to limit it to 1.5°C above pre-industrial levels. Additionally, the agreement aims to increase the ability of countries to deal with the impacts of climate change, and at making finance flows consistent with a low GHG emissions and climate-resilient pathway.
Paris aligned	Aligned to the Paris Agreement goals.
Power Purchase Agreement (PPA)	A type of contract that allows a consumer, typically large industrial or commercial entities, to form an agreement with a specific energy generating unit. The contract itself specifies the commercial terms including delivery, price, payment, etc. In many markets, these contracts secure a long-term stream of revenue for an energy project. In order for the consumer to say they are buying the electricity of the specific generator, attributes shall be contractually transferred to the consumer with the electricity.
Scope 1 greenhouse gas emissions	Scope 1 greenhouse gas emissions are direct emissions from operations that are owned or controlled by the reporting company. For Orica, these are primarily emissions from industrial manufacturing processes and natural gas feedstocks.
Scope 2 greenhouse gas emissions	Scope 2 greenhouse gas emissions are indirect emissions from the generation of purchased or acquired electricity, steam, heat or cooling that is consumed by operations that are owned or controlled by the reporting company.
Scope 3 greenhouse gas emissions	Scope 3 greenhouse gas emissions are all other indirect emissions (not included in Scope 2) that occur in the value chain. For Orica, these are primarily emissions resulting from purchased goods and services which account for around two-thirds of our global Scope 3 GHG emissions.
Supply chain	A sub-set of our wider value chain, our supply chain consists of the network of entities which source inputs and materials for our operations (upstream supply chain) and then the distribution of our finished goods and services to our customers and/or end-users (downstream supply chain). Orica is considered to have a vertically integrated supply chain.
Surrenders	The surrendering of carbon credit units in a registry (and/or delivery of generated units to government through regulatory schemes) to make claimable emissions reductions in a GHG emissions inventory, leading to a reported net GHG emissions figure.
Target	Refers to a goal we are aiming to achieve where we have developed a delivery pathway.
tCO_2-e	Tonne of carbon dioxide equivalent.
TIER	Technology Innovation and Emissions Reduction Regulation (Government of Alberta, Canada).
Value chain	A value chain describes the full chain of a business's activities in a specific industry in order to create and deliver a product or service to an end-customer. A supply chain sits within the wider value chain. Our value chain includes our suppliers (and potentially their suppliers), our operations, our distribution channels, and our customers, who are the end users of our products.

APPENDIX 1: TCFD ROADMAP

In FY2020, we undertook a gap analysis against the TCFD recommendations and developed a roadmap to guide our response over a three-year period. This report marks our third year of disclosure against our TCFD roadmap.

From FY2023 onwards, the TCFD recommendations and other emerging guidance and frameworks on climate change action and transition planning will continue to inform climate risk management at Orica. Going forward a dedicated yearly workstream of internal projects to embed processes and tools into our strategic and financial planning, will be conducted as part of our ongoing integration.

Commencement date | Action completed | Ongoing action

TCFD recommendations		Orica actions	FY2020	FY2021	FY2022
Governance	Disclose the organisation's governance around climate change-related risks and opportunities	– Strengthen Board and committee oversight of climate-related issues			
		– Establish a cross-functional, management-level steering committee to ensure progressive alignment with TCFD and integrated thinking	✓		
		– Strengthen climate-related governance processes to embed climate-related considerations into decision-making at function, region and division level of the business		✓ →	
Strategy	Disclose the actual and potential impacts of climate-related risks and opportunities on the organisation's businesses, strategy, and financial planning where such information is material	– Integrate climate change considerations into strategic scenario planning processes to analyse potential financial impacts and assess business resilience under different scenarios	↻	✓ →	
		– Review and develop strategic responses to mitigate risks and maximise opportunities informed by scenario planning and risk assessments	↻ →		
		– Develop a long-term operational GHG emissions decarbonisation pathway	↻	✓ →	
		– Participate in the Australian Industry Energy Transitions Initiative to support efforts to decarbonise hard-to-abate sectors	↻		✓
Risk Management	Disclose how the organisation identifies, assesses, and manages climate-related risks	– Complete a company-wide climate risk assessment to identify physical and transitional risks and opportunities over the short, medium and long-term	✓ →		
		– Review strategic and operational risk definitions, outlooks and signposts in light of the outcomes of the climate risk assessment and scenario planning processes	↻	✓ →	
		– Review Enterprise Risk Management framework to ensure it appropriately incorporates climate change considerations	↻	✓ →	
		– Complete further detailed analysis of priority climate-related risks and opportunities		✓ →	
Metrics and Targets	Disclose the metrics and targets used to assess and manage relevant climate-related risks and opportunities where such information is material	– Set medium-term emissions reduction targets informed by the decarbonisation pathway	✓		
		– Improve the completeness of the Scope 3 GHG emissions inventory	↻	✓ →	
		– Scope 1, 2 and (material) 3 GHG emissions	↻	✓ →	
		– Introduce climate-related performance metrics into remuneration incentives	↻	✓ →	
		– Develop additional metrics and targets for assessing climate-related risks and opportunities in line with strategy, financial and risk management processes		↻ →	
		– Disclose metrics and performance against targets for assessing climate-related risks and opportunities		↻ →	

APPENDIX 2: CARBON CREDITS

The table below provides a breakdown of Australian Carbon Credit Units (ACCU) surrendered in FY2022 and the associated ERF project from which they were created.

ACCU type	ERF project type	ERF project detail		Vintage	Quantity
Non-Kyoto ACCUs	Human-Induced Regeneration	ERF101812	Longdowns Regeneration Project	2018-2019	1,515
		ERF101557	Urana Regeneration Project	2017-2018	2,897
		ERF101710	Gumbo Regeneration Project	2016-2017	417
		ERF101702	Paroowidgee Regeneration Project	2016-2017	449
		ERF101318	Clovelly Regeneration Project	2016-2017	441
		ERF101437	Stanbert Regeneration Project	2016-2017	2,159
		ERF101830	Wambin Carbon Project	2016-2017	1,240
		EOP101165	Pingine Regeneration Project	2016-2017	749
		ERF101430	Waverley Downs Regeneration Project	2015-2016	5,167
Kyoto ACCUs	Human-Induced Regeneration	ERF118418	Mount Margaret Regeneration Project	2022	10,000
		ERF101812	Longdowns Regeneration Project	2018-2019	975
		ERF101647	Aqua Downs Station Regeneration Project	2018-2019	14,550
		ERF101647	Aqua Downs Station Regeneration Project	2018-2019	3,017
	Commercial and Public Lighting	ERF102020	National Carbon Bank Lighting Projects 2016	2018-2019	1,424
	Landfill Gas	EOP100657	NAWMA Landfill Gas Project	2018-2019	8,584
		EOP100162	Drysdale Landfill Gas Project	2018-2019	4,996
		EOP100235	Stuart Landfill Gas Project	2018-2019	1,420

APPENDIX 3: ENERGY AND EMISSIONS DATA

Data presented in this report covers our performance for FY2022. Disclosure of our remaining sustainability performance is in our ESG Data Centre.

		FY2018[1]	FY2019[1]	FY2020	FY2021	FY2022
SCOPE 1 EMISSIONS						
Global Scope 1	**$ktCO_2$-e**	**2,244**	**2,092**	**1,849**	**1,628**	**1,678**
Breakdown by GHG:						
Global CH_4	$ktCO_2$-e	–	–	0.58	0.58	0.61
Global CO_2	$ktCO_2$-e	–	–	682	685	711
Global N_2O	$ktCO_2$-e	–	–	1,163	942	967
Breakdown by country:						
Australia	$ktCO_2$-e	–	–	1,606	1,376	1,459
Indonesia	$ktCO_2$-e	–	–	125	116	150
Canada	$ktCO_2$-e	–	–	103	108	43
Rest of world	$ktCO_2$-e	–	–	13	28	25
Percentage of Scope 1 emissions subject to carbon regulations[2]		–	–	88%	87%	84%
SCOPE 2 EMISSIONS						
Global Scope 2	**$ktCO_2$-e**	**260**	**242**	**267**	**271**	**265**
Breakdown by country:						
Australia	$ktCO_2$-e	–	–	172	174	175
Indonesia	$ktCO_2$-e	–	–	33	32	28
Canada	$ktCO_2$-e	–	–	47	44	44
Rest of world	$ktCO_2$-e	–	–	18	21	18
Gross Global Emissions (Scope 1 & 2)		**2,504**	**2,334**	**2,116**	**1,898**	**1,943**
CARBON CREDITS						
Carbon credits surrendered	$ktCO_2$-e					(60)
Net Global Emissions (Scope 1 & 2)		**2,504**	**2,334**	**2,116**	**1,898**	**1,883**
SCOPE 3 EMISSIONS						
Global Scope 3[3]		**4,416**	**4,615**	**6,153**	**7,048**	**6,541**
Breakdown by material sources:						
Purchased ammonia (NH_3)	$ktCO_2$-e	791	722	962	973	1,055
Purchased ammonium nitrate (AN)	$ktCO_2$-e	3,625	3,892	3,321	3,834	2,957
Other Scope 3	$ktCO_2$-e	–	–	1,870	2,241	2,529
Breakdown by value chain category[4]:						
1. Purchased goods and services	$ktCO_2$-e	–	–	4,926	5,498	4,608
Purchased ammonia (NH_3)	$ktCO_2$-e	791	722	962	973	1,055
Purchased ammonium nitrate (AN)	$ktCO_2$-e	3,625	3,892	3,321	3,834	2,957
Other purchased goods and services	$ktCO_2$-e	–	–	643	691	596
2. Capital goods	$ktCO_2$-e	–	–	26	159	202
3. Fuel and energy-related activities not included in Scope 1 and 2	$ktCO_2$-e	–	–	96	93	233

(1) Where data has not been presented, this is due to historical data breakdowns not being available.

(2) Regulated Scope 1 emissions from our manufacturing facilities in Canada (Carseland, Alberta) and Australia (Kooragang Island, NSW and Yarwun, QLD).

(3) Full Scope 3 inventory disclosed for the first time in FY2021.

(4) To identify relevant emissions sources and the boundary for our Scope 3 inventory, we assess emissions activities using relevance criteria according to the GHG Protocol's Corporate Value Chain (Scope 3) Accounting and Reporting Standard. Scope 3 categories which were deemed not relevant based on this assessment are shown as "not relevant".

APPENDIX 3: ENERGY AND EMISSIONS DATA

		FY2018[1]	FY2019[1]	FY2020	FY2021	FY2022
4. Upstream transportation and distribution	$ktCO_2$-e	–	–	229	367	481
5. Waste generated in operations	$ktCO_2$-e	–	–	17	21	11
6. Business travel	$ktCO_2$-e	–	–	11	6	11
7. Employee commuting	$ktCO_2$-e	–	–	14	17	20
8. Upstream leased assets	$ktCO_2$-e	–	–	Not relevant	Not relevant	Not relevant
9. Downstream transportation and distribution	$ktCO_2$-e	–	–	Included in category 4 above	Included in category 4 above	Included in category 4 above
10. Processing of sold products	$ktCO_2$-e	–	–	6	7	10
11. Use of sold products	$ktCO_2$-e	–	–	829	880	955
12. End-of-life treatment of sold products	$ktCO_2$-e	–	–	0.4	0.4	0.1
13. Downstream leased assets	$ktCO_2$-e	–	–	Not relevant	Not relevant	Not relevant
14. Franchises	$ktCO_2$-e	–	–	Not relevant	Not relevant	Not relevant
15. Investments[2]	$ktCO_2$-e	–	–	–	–	10
Gross Global Emissions (Scope 1, 2 & 3)	**$ktCO_2$-e**	**6,920**	**6,949**	**8,269**	**8,947**	**8,485**
Net Global Emissions (Scope 1, 2 & 3)	**$ktCO_2$-e**	**–**	**–**	**–**	**–**	**8,425**
EMISSIONS INTENSITY						
Global emissions intensity[3]	tCO_2-e/t AN sold	1.81	1.75	1.67	1.64	1.38
Ammonia emissions intensity[4]	tCO_2-e/ tNH_3	1.79	1.81	1.86	1.77	1.80
Nitric acid emissions intensity[5]	tCO_2-e/ tHNO3	1.30	1.09	0.99	0.83	0.81
ENERGY						
Total stationary energy	**TJ**	**8,488**	**9,856**	**8,611**	**8,603**	**8,892**
Breakdown by stationary energy source:						
Electricity	TJ	1,258	1,261	1,177	1,195	1,143
Renewable electricity (generated by Orica)	TJ	–	–	2.2	1.9	1.3
Natural gas	TJ	6,087	7,562	6,368	6,131	6,470
Steam	TJ	896	645	786	894	884
Diesel	TJ	133	220	192	292	314
Petrol/gasoline	TJ	0.07	0.06	0.07	5.3	1.9
LPG	TJ	3.2	3.2	3.2	2.6	2.3
Other	TJ	111	165	83	82	77
Total transport energy	**TJ**	**208**	**196**	**184**	**228**	**239**
Breakdown by transport energy source:						
Diesel	TJ	191	187	178	218	231
Petrol/Gasoline, including E10 and PULP	TJ	9.0	3.3	2.3	6.8	7.6
LPG	TJ	8.1	5.6	3.7	3.5	0.07
Fuel used as feedstocks	TJ	9,361	9,235	9,731	9,610	10,225
Energy intensity	GJ/t AN sold	5.5	5.9	5.7	5.5	5.5

(1) Where data has not been presented, this is due to historical data breakdowns not being available.

(2) Data collation ongoing.

(3) On a net emissions basis. Scope 3 emissions from purchased AN and ammonia only included in emissions intensity metric.

(4) Total Scope 1 and 2 emissions from ammonia manufacturing facility per tonne of ammonia produced.

(5) Scope 1 emissions (nitrous oxide only) from nitric acid manufacture per tonne of nitric acid produced.

APPENDIX 4: DETAILED SCENARIO DESCRIPTIONS

Scenario	Narrative	Metrics	Actions/Outcomes for Orica
 **Scenario 1: Ambitious Coordinated Global Action** Informed by IEA WEO 2020 SDS[1], Wood Mackenzie AET-2[2], and IPCC RCP2.6	– **Macro and policy:** Transition to a lower-carbon economy becomes one of the drivers of global economic growth, partly constrained by reduced end-use consumption. – **Technology:** Broader innovation and technology investment drives accelerated adoption of new technology, including breakthrough clean technologies, and early retirement of conventional capacity. – **Market:** Consumer and stakeholder preferences evolve towards building a zero-emission circular economy. – **Climate change:** Global cooperation and commitment among governments to address climate change puts global emissions on the 1.5°C trajectory. Timely adaptation and mitigation measures allow the economies to deal with physical climate impacts.	**Macro and policy:** – Global GDP growth of 2.2% p.a. to 2040. – Average IP growth of 2.0% p.a. to 2040. – Above-average world trade. **Technology:** – Grid-scale energy storage commercially available before 2030. – Low-carbon hydrogen and biomethane substitute 7% of natural gas in 2040. – >20% of coal-fired capacity equipped with Carbon Capture, Utilisation and Storage (CCUS) by 2040. **Market:** – Global share of coal electric capacity declines from 34% in 2019 to 6% in 2040. – Share of Blast Furnace steel in China declines from 89% in 2019 to 75% in 2040. **Climate change:** – Global warming 1.5°C by 2100. – Governments deliver against their NDC targets aligned with the Paris Agreement. – Carbon pricing broadly aligned with the IEA's WEO 2019 SDS: $121-$161 in 2030 (in 2020 real terms).	– Supply chain economic transition risks heighten quickly. – Clear market signals justify a rapid pivot of our customer base towards future facing commodities. – Accelerating government and customer ambition incentivises rapid integration of lower-carbon innovations in our products and services. – Significantly heightened reputational and investment/divestment risks as investors and other external stakeholders scrutinise whether our commodity exposure is aligned to the Paris Agreement objectives. – More effective management of physical risks of climate change.

(1) Sustainable Development Scenario.

(2) 2°C Scenario.

APPENDIX 4: DETAILED SCENARIO DESCRIPTIONS

Scenario	Narrative	Metrics	Actions/Outcomes for Orica
 **Scenario 2: Widespread Nationalistic Economic Policy** Informed by IEA WEO 2019 STEPS, Wood Mackenzie ETO, and IPCC RCP8.5	– **Macro and policy**: Protectionist policies and low level of global collaboration result in uncertain macroeconomic environment with two major recessions to 2040. – **Technology**: Limited policy support and insufficient investment in new technology result in continued reliance on conventional sources of power generation and in industrial applications. – **Market**: Consumers and industry driven by economic choices and rely on conventional options. – **Climate change**: As countries fail to deliver on stated climate commitments and in the absence of a global mitigation framework, focus shifts to adaptation and resilience. Physical climate change intensifies impacts on operations and supply chains.	**Macro and policy:** – 1.3% p.a. global GDP growth to 2040. – Average IP growth of 1.0% p.a. to 2040. – Below average world trade. **Technology:** – Grid-scale storage is not commercially available before 2035. – Limited hydrogen end-use to 2040. – Limited use of CCUS to 2040. **Market:** – Global share of coal electric capacity declines from 34% in 2019 to 21% in 2040. – Blast Furnace steel in China declines from 89% in 2019 to 86% in 2040. **Climate change:** – Global warming of 4°C by 2100. – Majority of governments abandon NDC targets.	– Lower-carbon transition forces do not drive material risks within our supply chains. – Weak market and policy signals disincentivise: investment in low-carbon innovation in our products and services; and a restructuring of our client base towards future-facing commodities. – Subdued demand for products and services particularly during recession periods. – Physical impact risks rise rapidly and significantly in a 4°C world, exposing operations and supply chain to significant disruption and associated financial impacts
 **Scenario 3: Emergence of New Regional Growth Centres** Informed by IEA WEO 2019 STEPS, Wood Mackenzie ETO and AET, and IPCC RCP6.0	– **Marco and policy**: Successful completion of reforms that remove barriers to economic growth in India and Africa, facilitated by increased global collaboration and trade with benefits extending to all regions. – **Technology**: High capacity of the private and public sectors to invest in technology development, leading to a proliferation of innovative products. Accelerated technology adoption profile seen in most industries. – **Market**: Developed countries and China accelerate adoption of lower-carbon emission technologies while India and Africa develop mostly along a conventional pathway. – **Climate change**: Governments deliver on stated climate change policies. To offset additional emissions experienced in India and Africa, the US, the EU and China ramp up their ambition to a level aligned with the Paris Agreement.	**Macro and policy:** – 3.6% p.a. global GDP growth to 2040. – Average IP growth of 3.2% p.a. to 2040. – Above average world trade. **Technology:** – Grid-scale storage commercially available in 2032. – Limited hydrogen end-use to 2040. – Limited use of CCUS to 2040. **Markets:** – Coal-fired electric capacity declines from 34% in 2019 to 17% in 2040. – Blast Furnace in China declines from 89% in 2019 to 84% in 2040. **Climate change:** – Global warming of 3.0°C by 2100. – Governments deliver against increased NDC targets.	– Supply chain transition risk management becomes complex, as climate mitigation frameworks are somewhat disjointed. – Conflicting market signals across jurisdictions increase complexity in: servicing disparate customer demands; and pivoting our client base towards future-facing commodities. – Growing reputational and divestment risks where our service markets perceived by investors and civil society as misaligned to the Paris Agreement. – Physical impact risks rise significantly in a 3°C -aligned transition, exposing operations and supply chain to increasing disruption and associated financial impacts.

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