2019 Alcoa Sustainability Report

Alcoa

Alcoa Sustainability Performance 2019

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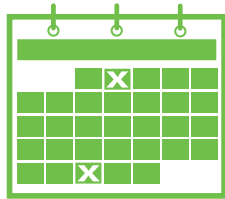employee and contractor fatalities

0.2%
increase in energy intensity

0.86
days away, restricted and transfer rate per 100 full-time workers

0.4%
increase in carbon dioxide equivalent emissions

Approximately
73%
of electricity consumed by our smelters was from renewable sources
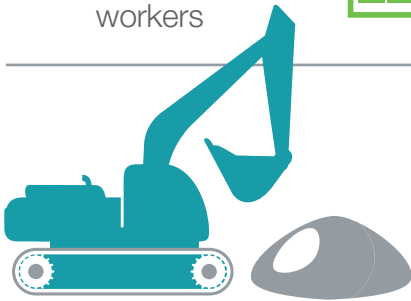
6%
reduction in bauxite residue land requirements per 1,000 metric tons of alumina produced since the 2015 baseline
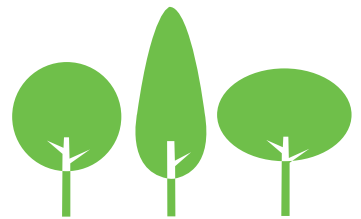
7.7%
increase in landfilled waste

0.1%
decline in net water consumption

0.97:1
ratio for new active mining disturbance to mine rehabilitation for the 2015 to 2019 period

15.5%
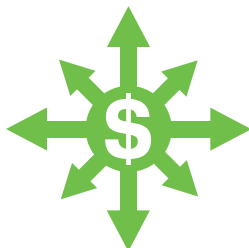of our global employees were women

US$6.0
million in Alcoa Foundation community investments

95
score on the Corporate Equality Index 2019

US$8.8
billion in purchased goods and services

9,999
employee volunteer hours in the community

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Materiality
Throughout this report, materiality refers to the list of sustainability topics about which Alcoa communicates because they are material for our stakeholders in this context. It should not be confused with materiality for financial reporting or regulatory purposes.

Forward-looking Statements
This report contains certain statements that relate to future events and expectations and, as such, constitute forward-looking statements within the meaning of the Private Securities Litigation Reform Act of 1995. Forward-looking statements include those containing such words as "anticipates," "believes," "could," "estimates," "expects," "forecasts," "goal," "intends," "may," "outlook," "plans," "projects," "seeks," "sees," "should," "targets," "will," "would" or other words of similar meaning. All statements that reflect Alcoa's expectations, assumptions or projections about the future, other than statements of historical fact, are forward-looking statements. Forward-looking statements by Alcoa are not guarantees of future performance and are subject to known and unknown risks, uncertainties and changes in circumstances that are difficult to predict. Although Alcoa believes that expectations reflected in any forward-looking statements are based on reasonable assumptions, it can give no assurance that these expectations will be attained, and it is possible that actual results may differ materially from those indicated by these forward-looking statements due to a variety of risks and uncertainties. For a discussion of some of the specific factors that may cause Alcoa's actual results to differ materially from those projected in any forward-looking statements, see risk factors described in our most recent Annual Report on Form 10-K for the fiscal year ended December 31, 2019, filed with the Securities and Exchange Commission on February 21, 2020, in Part I, Item 1A, "Risk Factors." Alcoa disclaims any obligation to update publicly any forward-looking statements, whether in response to new information, future events or otherwise, except as required by applicable law.

From the CEO

Sustainability has always been embedded in the way Alcoa operates. In 2019, we acknowledged that this history is also part of our vision for the future by adding "advance sustainably" as one of our company's strategic priorities.

This new priority represents our focus on developing and maintaining a company with engaged employees who leverage sustainability to differentiate our operations and products. We take sustainability seriously because it is good for our business, our stakeholders and the world. It is the right thing to do.

Our actions in support of this priority in 2019 included:
- Refreshing a number of our strategic, long-term sustainability goals to better align with our expectations and those of our stakeholders;
- Pursuing Aluminium Stewardship Initiative (ASI) certification for 10 of our locations, with all of those locations achieving certification in early 2020;
- Joining the International Council on Mining and Metals (ICMM), which is focused on enhancing the industry's contribution to society with safe, fair and sustainable practices;
- Adopting new corporate standards for biodiversity management and water and wastewater management;
- Publishing a new Human Rights Policy and conducting human rights risk assessments and due diligence;
- Deploying a new Global Supplier Sustainability Program with a more robust due diligence process to reduce our supply chain risk; and
- Through Alcoa Foundation, investing US$6 million in our communities and for global signature programs focused on climate change and biodiversity.

While we made progress toward our sustainability goals in 2019, we will continue to have opportunities for improvement as we move forward.

Sadly, we experienced three serious injuries in 2019 and a contractor fatality in early 2020. We will continue to learn from these and other past incidents to enhance our global safety systems so no one ever loses a life at an Alcoa facility. That is our most important objective. We have it front of mind always, but especially as we continue to confront the COVID-19 pandemic in 2020.

We saw reductions in our net water consumption and major spills, but our greenhouse gas emissions, landfilled waste and energy consumption increased. The number of women in our global workforce grew, but we fell short of our 2019 diversity goal.

In 2020, we will continue to drive for improvement in all areas of sustainability. More clearly articulating our third strategic priority as "advancing sustainably" helps to ensure that all Alcoans are aligned in that goal.

We also will work to ensure our people and communities are at the center of our efforts to improve our social management system. We will offer an increased selection of differentiated products to serve a more sustainable society in partnership with our customers, and we will pursue additional ASI certifications to enable that goal.

I encourage you to read this 2019 Sustainability Report to learn more about our efforts to advance sustainably not only for our company but for the aluminum industry and the world.

Roy C. Harvey
President and Chief Executive Officer

Our Company

Corporate Overview

Alcoa is a global industry leader in bauxite, alumina and aluminum products. Our company is built on a foundation of strong Values and operating excellence dating back more than 130 years to the world-changing discovery that made aluminum an affordable and vital part of modern life.

FOUNDED:	November 1, 2016, when Alcoa Inc. separated into Alcoa Corporation and Arconic Inc.
GLOBAL HEADQUARTERS:	Pittsburgh, Pennsylvania, USA
VALUES:	Act with Integrity. Operate with Excellence. Care for People.
2019 REVENUE:	US$10.4 billion
2019 EMPLOYEES:	13,800

Business Segments

Bauxite: We have ownership in seven active bauxite mines globally and operate four of them in Australia and Brazil. 2019 bauxite production: 47.4 million dry metric tons.

Alumina: We are a world leader in the production of alumina, operating six refineries in Australia, Brazil and Spain. 2019 alumina production: 13.3 million metric tons.

Aluminum: This segment includes aluminum smelting, casting and rolling, along with the majority of our energy assets. 2019 primary aluminum production: 2.1 million metric tons.

Alcoa Locations

Mosjøen
Fjarðaál
Lista
★Strathcona
Baie-Comeau
Bécancour
Deschambault
Manicouagan★
San Ciprián
Massena West
Warrick
Lake Charles★★
Wenatchee
Intalco
★Guinea
Juruti
Mineracño Rio Do Norte★
São Luís
Estreito★
Serra do Facão★
Machadinho★
Barra Grande★
Poços de Caldas
Ma'aden JV★
Willowdale
Huntly
Pinjarra
Wagerup
Kwinana
Portland

Mine — Bauxite
Refinery — Alumina
Smelter and/or Casthouse — Aluminum
Rolling Mill — Aluminum
Power Plant — Aluminum

*Minority ownership, non-operating partner
**Facility calcines petroleum coke for the aluminum segment

Governance, Ethics and Compliance

Act with integrity is the cornerstone of our corporate Values. We expect all Alcoa employees to be open, honest and accountable and to adhere to the codes and policies that guide their behavior.

Governance

Our Board of Directors has adopted Corporate Governance Guidelines and our board committee charters to promote the effective functioning of the board, board committees and our overall corporate governance practices.

Ethics and Compliance

Communicating

Our codes and policies are available to each employee through our intranet. When we implement a new policy or make significant changes to an existing one, we use targeted communication channels to reach the impacted individuals.

Our global network of Integrity Champions is another means to communicate and reinforce ethical behavior. These employees ensure that ethics and compliance are an integral part of business, promote a culture of integrity, raise awareness of the role of ethics, and serve as trusted advisors and resources.

Training

We require every employee to complete Code of Conduct training. Delivered online or in a classroom environment, the training references key policies and procedures and covers specific topics of importance that change on a regular basis.

In 2019, our Ethics and Compliance team traveled to Alcoa-owned and joint venture locations in Africa, Brazil, Canada, China and the United States to deliver in-person training on our Code of Conduct, policies and procedures, anti-corruption principles and the expectations we have of supervisors. In addition, all of our salaried employees completed training on anti-bribery, data privacy and avoidance of trafficked labor.

Reporting and Investigating

Employees and external stakeholders who have ethics-related questions or concerns or want to report suspected breaches of laws, policies or our Values can do so through our confidential Integrity Line. Accessible 24 hours a day, seven days a week, the line is available in multiple languages.

An independent company receives all issues and concerns reported through the Integrity Line and promptly directs them to our Ethics and Compliance (E&C) organization for follow-up using the following procedures:

- The reporter is given a private code that he or she can reference for investigation status updates. The reporter may obtain updates by calling the Integrity Line, checking the web reporting site or contacting the investigator directly.
- Our E&C organization conducts an initial review of the matter to determine the most appropriate method of investigation. Where appropriate, the E&C organization sends the matter directly to the relevant Alcoa location for investigation. Investigations that are not appropriate for the location to handle are retained for investigation by the corporate E&C team.
- Investigations are handled promptly, thoroughly and confidentially.
- The identity of the reporter is kept strictly confidential throughout the process and only disclosed to authorized persons, when necessary, to carry out the investigation or as otherwise required by law.
- A final determination is made as to whether the allegation or concern was substantiated or unsubstantiated. The response to substantiated matters is determined on a case-by-case

basis and may include disciplinary action up to and including termination but tailored to the seriousness of the substantiated facts.

In 2019, the Integrity Line fielded 203 calls. Of these, 13 percent resulted in disciplinary action and 51 percent were inquiries or other matters that did not require investigation or substantial follow-up. The majority of the calls (77 percent) were employment related, with the remainder related to business integrity, health and safety, trade and general inquiries.

Tracking and Auditing

Each year, every Alcoa location worldwide uses the Alcoa Self Assessment Tool (ASAT) to identify and close gaps in numerous areas of audit focus, including ethics and compliance. E&C items evaluated in the ASAT include:

- Communication of Alcoa's values and E&C-related policies, procedures and requirements;
- Completion of mandatory Code of Conduct training;
- Establishment of internal controls and business processes to enable employee awareness of the anti-corruption program requirements;
- Establishment of effective controls to mitigate the risk of corruption with charitable contributions.

Our internal audit team also evaluates E&C implementation and effectiveness as part of its standard audit protocols when conducting full audits of our locations. These assessments occur at least once every two to five years per location, or more frequently based on risk.

Political Contributions

In general, our Political Contributions Policy prohibits the use of company funds, property, services or other items of value for political purposes. Rare exceptions may be made, such as favoring or opposing a ballot or referendum vote that can impact our company.

The Alcoa Corporation Employees' Political Action Committee may collect and disburse contributions to U.S. candidates for public office and political parties in accordance with federal and state law.

Alcoa Corporation did not make any direct donations to the election campaigns of politicians in 2019. As permitted by U.S. and state law, qualified Alcoa employees voluntarily donated approximately US$50,000 to U.S. candidates for political office in 2019 through the Alcoa Corporation Employees' Political Action Committee.

Related Information

Corporate Governance Guidelines
Code of Conduct
Anti-Corruption Policy
Human Rights Policy
International Trade Compliance Policy

Legal Compliance

Under the leadership of our general counsel, our Legal Department is responsible for legal compliance and management of our legal risks. As part of these duties, the Legal Department oversees ongoing legal matters, governmental proceedings and regulatory developments that may affect Alcoa and our subsidiaries and controlled affiliates.

Because of the geographic diversity and complexity of our operations, and in support of these efforts, the general counsel relies upon a global team of in-house lawyers and outside counsel to achieve our legal compliance objectives.

The Legal Department, with the assistance of outside counsel, monitors legal and regulatory compliance and manages legal risks, including legal and regulatory developments and areas of evolving risk. Our in-house lawyers are qualified and experienced in the primary jurisdictions where we have operations, specifically Australia, Brazil, Europe and North America. These lawyers are responsible for ensuring compliance with applicable laws and regulations in their respective jurisdictions, and they advise on reporting obligations and manage ongoing legal matters and proceedings. When needed, external counsel is engaged to address specific areas of expertise or jurisdictions.

The general counsel has designated an in-house lawyer to serve as the primary legal counsel for each operating location and resource function within the company. This lawyer coordinates the legal affairs for the operating location or resource function, including:
- Ensuring compliance with laws;
- Exchanging information on legal matters with the operating location or resource function leadership; and
- Providing legal counseling and preventive law training on issues and topics relevant to the operating location or resource function.

Our Legal Department works closely with other resource functional areas that are tasked with monitoring and ensuring compliance. This includes identifying and maintaining relevant information in specific areas, such as our Environmental, Health and Safety Department (EHS laws and regulations), Human Resources Department (labor and employment laws and regulations) and Ethics and Compliance Department (bribery and anti-corruption and Code of Conduct).

The Legal Department maintains relationships with external legal counsel in various jurisdictions that possess expertise in subject matters relevant to our businesses. As a matter of policy, all external counsel working on our behalf are engaged and managed by Legal Department lawyers to ensure that our lawyers maintain knowledge of, and control over, our legal compliance efforts and any legal matters impacting the company.

Value Creation Process

By transforming natural resources into aluminum, we create value for our stockholders, customers, suppliers and the communities where we operate. It is critical to balance the inputs and outputs to maximize the benefits and minimize the negative impacts of our processes.

The following simplified analysis of our value creation process identifies our key inputs, outputs and effects on stakeholders. We used this information to help determine our material topics.

PRODUCTION PROCESS

General Aspects Applicable to All Processes

Bauxite Mining
87% internal consumption, 13% third-party shipments

Key Inputs

Financial resources; labor; governance systems; infrastructure

Bauxite reserves; land surface; water

Key Outputs

Salaries; taxes; skilled employees

Bauxite; royalties; wastewater; air emissions; noise; rehabilitated land

Key Effects

Income stability; professional development; local economic development; environmental impact; value for stockholders

Potential community relocation; biodiversity disturbance; changes to landscape

PRODUCTION PROCESS

Alumina Refining
30% internal consumption,
70% third-party shipments

Aluminum Production
100% third-party shipments

Energy Generation

Key Inputs

Bauxite; water; caustic soda; energy	Alumina; energy; aluminum fluoride; coke and pitch; aluminum scrap; water	Water; coal; land surface; distribution infrastructure

Key Outputs

Alumina; bauxite residue; greenhouse gas emissions; other air emissions; noise	Aluminum; greenhouse gas, fluoride, sulfur dioxide and other emissions; spent pot lining; aluminum dross	Electricity; rehabilitated land; fly ash; greenhouse gas emissions; combustion emissions

## Key Effects

Changes to landscape; potential reduction of water reserves	Potential effects on local vegetation; contribution to climate change; product development (alloys)	Effects on the landscape; contribution to climate change; biodiversity impacts; potential community relocation

Data are approximate.

Sustainability at Alcoa

Sustainability Approach
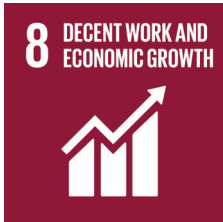
Across our global operations, sustainability drives us to minimize our negative impacts and maximize our value.

Advance sustainably is a strategic priority for our company. We believe that we can accelerate value creation by answering society's increasing demand for sustainable solutions, which will benefit both our company and our stakeholders.

Our sustainability strategy supports our strategic priorities through three pillars:

- Create sustainable value for the communities where we operate, with the aim to maintain our license to operate and grow our business.
- Enhance the value of our products through differentiation to improve our profitability.
- Minimize our negative environmental impacts and improve our health and safety performance to protect environmental and employee well-being and reduce our long-term risk exposure.

Our sustainability performance has earned us the credibility and trust to mine bauxite in two of the most sensitive areas on the planet—the Brazilian Amazon and the jarrah forest in Western Australia. It guides us as we operate in countries

"ADEFIP (Association of People with Disabilities) thanks Alcoa and Instituto Alcoa for helping us achieve our mission— to achieve, through qualification and rehabilitation, the inclusion of people with disabilities in society and their right to citizenship. Our partnership makes it possible to take ADEFIP outside of our walls, inspiring the city and creating true public policies. We are very grateful for all the support. Together, we are more!"

Ana Paula Gonçalves Tranche
President
ADEFIP

with less demanding performance requirements. It keeps us in good standing with governments and communities to ensure access to bauxite reserves and enhance our long-term license to operate.

Helping guide our actions are our long-term sustainability goals, which cover the environment, our employees and the communities in which we operate. (See the Strategic Long-term Goals section.)

Strategic Priorities

- **Reduce complexity**
  A portfolio and operating model that is **low cost**, competitive and resilient in a low price environment
- **Drive returns**
  Improve commercial capabilities, invest in targeted growth opportunities, increase **margin focus** across the value chain
- **Advance sustainably**
  Continue to strengthen the balance sheet, transform portfolio and leverage our industry-leading environmental and social standards for a **sustainable** future

Drive results and **deliver returns** to stockholders over the long term

We also participate in industry initiatives, such as the European Aluminium's Sustainability Roadmap Towards 2025. Launched in 2015, this initiative sets voluntary targets for the European aluminum industry in the areas of responsible production, innovative applications and socio-economic contribution. We report our performance against the targets on a periodic basis through the European Aluminium website.

Creating Sustainable Value

We actively participate in the communities where we operate around the world, and we want these communities to thrive. We view our presence as an opportunity to help develop and enable economic activity, environmental practices and social programs that are sustainable, remaining even once our role ends. At the same time, being a good neighbor enables our operations to grow and create additional value.

Alcoa Foundation focuses globally on the countries and locations where we operate. It targets its investments on promoting the prevention of, and resilience to, climate change from human activity, as well as the restoration and preservation of biodiversity.

Instituto Alcoa, our foundation in Brazil, conducted a strategic review in 2019 to ensure that its giving aligns with the risks and impacts in our host communities, especially those related to our operations. The priority areas identified as a result of the analysis are education, income generation and social engagement.

In addition, our locations use the Alcoa Stakeholder Engagement Framework to work with stakeholders to identify local opportunities for value creation. (See the Stakeholder and Community Engagement section.)

Enhancing Product Value

The global markets in which we compete are increasingly driven by significant challenges, including population growth, urbanization, climate change and resource scarcity. Inherently sustainable, aluminum helps our customers address these challenges and capture the opportunities they present.

Aluminum enables safer and more energy-efficient buildings; more fuel-efficient cars, trucks and airplanes; and sustainable food and beverage packaging. It is also infinitely recyclable, reducing energy and resource consumption.

Our SUSTANA™ line of aluminum products is produced with low carbon emissions and recycled content. This platform allows us to position and differentiate our innovative, value-added products. (See the Products section.)

In 2019, we pursued Aluminium Stewardship Initiative certification to both the Performance and Chain of Custody standards for 10 locations. Four of them achieved Performance Standard certification by the end of the year, and the remaining six earned their certifications in January and February of 2020. ASI also awarded Chain of Custody certification to all 10 of these locations in the first quarter of 2020, enabling us to start selling certified bauxite, alumina and metal to any customer around the world.

ASI certification covers a wide range of indicators across the entire value chain in the areas of governance, environmental management and social responsibility. We endorse ASI for its holistic perspective and leading role in bringing the aluminum industry forward on sustainability.

We believe that our differentiated products with sustainable attributes create additional value for our customers, helping them to achieve their own sustainability targets and those of their customers.

Improving Our Footprint

Despite technological and process advancements, primary aluminum production remains energy- and resource-intensive and also impacts the natural and workplace environments.

Guiding our efforts are our ambitious 2025 and 2030 targets for greenhouse gas emissions, waste, water, mine rehabilitation, diversity and inclusion, safety and health, and stakeholder and community engagement. Our approach and performance for each can be found in the individual sections within this report.

We also serve as stewards of the land, operating in a manner that focuses on minimizing our negative impacts and maximizing ongoing sustainable use. Biodiversity management plans, industry-leading mining and mine rehabilitation processes, and asset management that covers a facility's entire life cycle help us optimize our land and facility management and support our license to operate. (See the Biodiversity and Mine Rehabilitation and Facility Stewardship and Transformation sections.)

Our focus on reducing our footprint enables us to reduce our operational costs and future liabilities, such as landfill remediation.

Reporting and Materiality

We are committed to transparent and thorough reporting on our sustainability performance.

We base the content of our sustainability reporting primarily on the requirements of the Global Reporting Initiative's GRI Standards, the International Council on Mining & Metals (ICMM) 10 Principles and eight Position Statements, our materiality analysis and feedback from our stakeholders. The information contained in this report covers all operations where we have operational control, unless otherwise noted.

In 2019, we engaged a third-party expert to conduct our latest sustainability materiality analysis to identify our current environmental, social and governance risks and opportunities. This information will be used to inform our business and sustainability strategies, more effectively engage with our stakeholders and ensure that our external reporting is relevant.

The analysis consisted of the following key components:
- Trend analysis and issue benchmarking against industry peers;
- Analysis of existing internal documentation on stakeholder input, such as location-specific materiality and stakeholder analyses;
- Survey of key employees to capture what they believed are the most significant issues for stakeholders (internal vision), as well as what they thought stakeholders felt were the most significant issues (external vision);
- Survey of external stakeholders, including those representing customers, communities in which we operate, government, non-governmental organizations and industry associations; and
- Prioritization of the material issues using the following matrix.

We considered our material issues to be those that our internal and external stakeholders ranked as 3.5 or higher on a scale of one (not important) to five (critical). The top 13 issues form the basis of our 2019 sustainability reporting.

2019 Material Issues

Rank	Topic	Boundary	Report Section
1	Regulatory compliance	All locations	Legal Compliance Environmental Compliance
2	Occupational health and safety	All locations	Safety and Health
3	Local commitment with communities	All locations	Shared Value Creation
4	Climate change	All locations, particularly our refineries, smelters and casthouses	Climate Protection
5	Air quality and emissions	All locations	Emissions
6	Ethics, transparency and good governance	All locations	Governance, Ethics and Compliance
7	Tailings management	Our refineries	Tailings Management
8	Waste management	All locations	Waste and Spills
9	Water stewardship	All locations, particularly those in water-stressed areas.	Water
10	Facilities closure, soil management and rehabilitation	All locations	Facility Stewardship and Transformation
11	Human rights	All locations, particularly those in high-risk areas	Human Rights
12	Economic performance	All locations	2019 Annual Report
13	Biodiversity	All locations, particularly our mines	Biodiversity and Mine Rehabilitation

Assurance

DNV GL provided limited assurance on the following using the International Standard on Assurance Engagements (ISAE) 3000:

- Scope 1 and Scope 2 greenhouse gas emissions data; DNV GL also assured the accuracy of the energy consumption data used as a basis for the calculation of these emissions.
- Scope 3 emissions data for seven categories:
  - Purchased goods and services;
  - Fuels and energy-related activities;
  - Transportation and distribution (upstream);
  - Waste generated in operations;
  - Business travel;
  - Product transportation and distribution (downstream); and
  - Processing of intermediate products sold to customers.
- Occupational health and safety data, including fatalities; events resulting in fatal or serious injury/illness; incidents resulting in days away, restricted or transfers; and lost workdays.

- Water withdrawal by source data.
- Landfilled waste.

DNV GL's limited assurance report is available in the report appendix.

In February 2020, 10 of our operating facilities were certified to the Aluminium Stewardship Initiative's Performance and Chain of Custody standards. (View the certifications.)

We have developed an environmental product declaration (EPD) covering the ECOLUM™ family of aluminum cast products. The information has been certified by UL, a third-party assessor. (Read the EPD.)

In addition, 80 percent of our operating plants are certified against the ISO 14001:2015 Environmental Management Systems standard, and 25 percent are certified against the OHSAS 18001:2007 or ISO 45001 Occupational Health and Safety Management System standards.

For the remaining information in this report, we relied on our stringent internal controls and management systems to ensure what we report is accurate and representative of our operations.

United Nations Sustainable Development Goals

We are committed to contributing to the United Nations Sustainable Development Goals (SDGs).

The SDGs where we can have the biggest impact are aligned with the European Aluminium initiative to link the industry's strategic sustainability ambitions closer to the SDGs.

Our progress against specific SDGs can be found in sections of this report that are marked with the following goal icons.

1 NO POVERTY	2 ZERO HUNGER	3 GOOD HEALTH AND WELL-BEING	4 QUALITY EDUCATION	5 GENDER EQUALITY	6 CLEAN WATER AND SANITATION
7 AFFORDABLE AND CLEAN ENERGY	8 DECENT WORK AND ECONOMIC GROWTH	9 INDUSTRY, INNOVATION AND INFRASTRUCTURE	10 REDUCED INEQUALITIES	11 SUSTAINABLE CITIES AND COMMUNITIES	12 RESPONSIBLE CONSUMPTION AND PRODUCTION
13 CLIMATE ACTION	14 LIFE BELOW WATER	15 LIFE ON LAND	16 PEACE, JUSTICE AND STRONG INSTITUTIONS	17 PARTNERSHIPS FOR THE GOALS	

International Council for Mining and Metals Principles and Position Statements

In 2019, Alcoa was accepted as a member of the International Council on Mining and Metals, which is focused on enhancing the industry's contribution to society with safe, fair and sustainable practices.

As a member, we must meet the commitments of the ICMM 10 Principles, eight Position Statements and all associated performance expectations. Our 2019 performance against these commitments is indicated throughout the report using the following icons.

Principle 1: Apply ethical business practices and sound systems of corporate governance and transparency to support sustainable development.

Principle 2: Integrate sustainable development in corporate strategy and decision-making processes.

Principle 3: Respect human rights and the interests, cultures, customs and values of employees and communities affected by our activities.

Principle 4: Implement effective risk-management strategies and systems based on sound science and which account for stakeholder perceptions of risks.

Principle 5: Pursue continual improvement in health and safety performance with the ultimate goal of zero harm.

Principle 6: Pursue continual improvement in environmental performance issues, such as water stewardship, energy use and climate change.
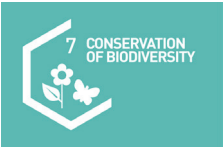
Principle 7: Contribute to the conservation of biodiversity and integrated approaches to land-use planning.

Principle 8: Facilitate and support the knowledge-base and systems for responsible design, use, re-use, recycling and disposal of products containing metals and minerals.

Principle 9: Pursue continual improvement in social performance and contribute to the social, economic and institutional development of host countries and communities.

Principle 10: Proactively engage key stakeholders on sustainable development challenges and opportunities in an open and transparent manner. Effectively report and independently verify progress and performance.

Strategic Long-term Goals

Our sustainability approach is driven by—and measured against—our strategic long-term goals, which further integrate sustainability into our business processes to minimize environmental impacts and maximize value for our stakeholders.

We review and update these goals on a periodic basis to ensure we are focused on items that are relevant to the company's strategic priorities and our current operations. We also seek input from stakeholders.

In 2019, we defined new goals for water conservation, waste management and stakeholder engagement/shared value creation. We also expanded our long-term goal to reduce our greenhouse gas footprint to encompass our alumina refining segment in addition to our aluminum smelting operations. These goals will be implemented in 2020.

Strategic Long-term Goals

Goals in 2019	Progress	Goals for 2020 Onward
From a 2015 baseline, reduce the intensity of our greenhouse gas footprint (direct and indirect emissions) from our smelting operations by 15 percent by 2025 and 20 percent by 2030. More	1.3 percent reduction from 2015	Align our GHG (direct + indirect) emissions reduction targets with the below 2° C decarbonization path by reducing GHG emission intensity by 30 percent by 2025 and 50 percent by 2030 from a 2015 baseline.
Define and implement a program focused on enhancing water-use efficiency at locations in water-scarce areas by 2020; define specific water-use reduction targets for 2025 and 2030. More	Updated our water and wastewater standard and set a new goal	From a 2015 baseline, reduce the intensity of our total water use from Alcoa-defined water-scarce locations by 5 percent by 2025 and 10 percent by 2030.
Optimize our portfolio of economically viable placement opportunities for by-product materials (from waste to value) by 2020; define specific objectives to be achieved by 2025 and 2030. More	Sold 148,380 metric tons of secondary materials in 2019	From a 2015 baseline, reduce landfilled waste by 15 percent by 2025 and 25 percent by 2030.

Stategic Long-term Goals

Goals in 2019	Progress	Goals for 2020 Onward
From a 2015 baseline, reduce bauxite residue land requirements per metric ton of alumina produced by 15 percent by 2030. More	5.8 percent reduction from 2015	No changes to previous goal. **12** RESPONSIBLE CONSUMPTION AND PRODUCTION **15** LIFE ON LAND
Maintain a corporate-wide running five-year average ratio of 1:1 or better for active mining disturbance (excluding long-term infrastructure) to mine rehabilitation. More	0.97:1 ratio for the 2015 to 2019 period	No changes to previous goal. **12** RESPONSIBLE CONSUMPTION AND PRODUCTION **15** LIFE ON LAND
Zero fatalities and serious injuries (life-threatening or life-altering injuries and illnesses). More	Zero fatalities and three serious injuries in 2019	No changes to previous goal. **3** GOOD HEALTH AND WELL-BEING **8** DECENT WORK AND ECONOMIC GROWTH
Attain an inclusive everyone culture that reflects the diversity of the communities in which we operate. More	Conducted our first global pay equity analysis for salaried employees.	No changes to previous goal. **5** GENDER EQUALITY **10** REDUCED INEQUALITIES
Reassess the implementation of key stakeholder engagement tools by 2020; define shared value creation opportunities to be implemented by 2025 and 2030. More	Launched a new Global Supplier Sustainability Program in 2019 and enhanced our human rights practices, including conducting human rights assessments and due diligence at select operational sites.	By 2022, implement a social management system at all locations, including the definition of performance metrics and long-term goals to be accomplished by 2025 and 2030 **3** GOOD HEALTH AND WELL-BEING **4** QUALITY EDUCATION **5** GENDER EQUALITY **8** DECENT WORK AND ECONOMIC GROWTH **10** REDUCED INEQUALITIES **16** PEACE, JUSTICE AND STRONG INSTITUTIONS **17** PARTNERSHIPS FOR THE GOALS

Opportunities and Challenges

Inherently lightweight, durable and infinitely recyclable, aluminum is well-positioned to capture opportunities that address climate change, urbanization, mobility and other global megatrends. The challenge is doing so without negating the positive impact, as primary aluminum production is energy- and resource-intensive and an emitter of greenhouse gases.

Key Opportunities

We have significant opportunities to further advance sustainability within our operations and those of our business partners. This is supported by our reputation as a sustainability leader and our holistic approach to doing business the right way.

Growth in Aluminum Demand

After a challenging 2019, global primary aluminum demand is facing renewed pressure from the Covid-19 pandemic. We remain optimistic in the long term regarding primary aluminum demand, especially in emerging markets like India and Southeast Asia.

Stricter emissions and fuel-efficiency regulations and increased consumer demand for more sustainable products have positioned aluminum as a metal of choice to reduce weight and increase recyclability without compromising performance. CRU estimates that many of our key markets will experience double-digit growth in aluminum use between 2019 and 2024 as a result:

- **Automotive:** 20 percent increase due to the growth of hybrid and electric vehicles, increased fuel-efficiency regulations, rising gas prices and low-carbon targets by the major OEMs.
- **Construction:** 15 percent increase resulting from increased demand for buildings featuring sustainable and energy-efficient materials and lower operating costs.

- **Packaging and foil:** 16 percent increase as key brands look for low-carbon products that help them achieve their carbon-reduction goals.

We are well-positioned to capitalize on this growth. We are a recognized sustainability leader within our industry, and this reputation facilitates access to resources required to grow. Our operations are also strategically located near the world's growth markets.

Product and Process Differentiation

We have opportunities to differentiate our products by leveraging our low-carbon portfolio across the entire aluminum-production process—bauxite mining, alumina refining, and aluminum smelting, casting and rolling. Key differentiators include:

- Our SUSTANA™ line of aluminum products reduces the carbon impact of our customers' supply chains, helping them achieve their sustainability goals. (See the Products section.)
- Our ASI certifications and membership in ICMM demonstrate that our bauxite, alumina and aluminum have been mined and produced following internationally approved standards addressing governance, environmental management and social responsibility. (See the Sustainability Approach section.)
- Advance sustainably is one of our three strategic priorities. (See the Sustainability Approach section.)

On the production side, we have opportunities to reduce our environmental footprint through process improvements and advanced technologies. (See the Improving Our Footprint section.)

Growing Investor Interest in Sustainability

Investors are increasingly evaluating a company's sustainability when assessing investment opportunities. Third-party assessments of a company's sustainability performance, such as the

Dow Jones Sustainability Index, are helping inform these decisions.

Our recognized leadership in sustainability, including being on the Dow Jones Sustainability Index each year since its inception, positions us favorably with sustainability-focused investors.

Key Challenges

While capturing the opportunities, we must address the challenges.

Aluminum Pricing

The fluctuation in the price of aluminum due to factors beyond our control, such as market sentiment, economic conditions, aluminum demand and cost deflation, is a persistent challenge.

Pricing also can be influenced by excess supply and production overcapacity, both of which are driven primarily by China. After being flat in 2019, China's aluminum production is expected to increase 6 percent in 2020. Approximately 84 percent of this production will be fueled by electricity produced at coal-fired plants.

Exposure to Carbon Markets

Various climate change agreements and industry's heavy carbon footprint have resulted in strengthening regulations for carbon emissions. Many countries have instituted or are considering emissions trading systems, carbon offsets, carbon taxes and other carbon-pricing initiatives to voluntarily mitigate climate change and build climate resilience.

In December 2019, the European Union launched its Green Deal to reach net-zero greenhouse gas emissions by 2050. Included in the roadmap is a proposed carbon border adjustment mechanism with a particular risk of a carbon border tax in Europe.

We have been participating in the carbon markets in Europe and Canada and will draw from this experience to address initiatives as they are introduced around the world. We are also coordinating with industry associations to respond to increasing expectations with improved management systems.

Increased Regulatory and Social Scrutiny

Regulatory scrutiny is increasing in our industry due to external events, including the collapse of another mining company's tailings dam in Brazil in 2019 and unauthorized mining occurring in countries such as Malaysia. We are committed to consistently ensuring compliance, using technology that meets or exceeds all regulations. We have many best-in-class systems, including our tailings dams and bauxite residue storage areas, and we work to remain ahead of regulations at our facilities. (See the Tailings Management section.)

While environmental awareness is strong in some regions, including Europe, the approach is not universal. The lack of universal regulations and standards across the value chain promotes different definitions of a sustainable product. This makes it more complex for the end user to react to different product proposals with sustainable attributes.

Technological Progress

While breakthrough technologies like our ELYSIS™ partnership can transform the aluminum industry and further increase its sustainability, challenges remain. Two major ones are improving energy efficiency and finding viable commercial uses for bauxite residue.

Operational Challenges

Sustainability challenges that we face within our own operations include:
- Eliminating fatalities and mitigating the risk of injuries for employees and contractors in our operations;
- Reducing our greenhouse gas emissions;
- Minimizing our freshwater use and improving the quality of the wastewater we discharge;
- Reducing our reliance on non-renewable natural resources;
- Maximizing opportunities to reuse or recycle all production coproducts and by-products and eliminating landfill disposal of our wastes;
- Mitigating impacts to land and biodiversity;
- Attracting, retaining and developing employees, especially in regions of the world where there is intense competition for talent and a limited pool from which to draw;
- Integrating our sustainability practices and expectations into our supply chain; and
- Enhancing our partnership with the communities where we operate and our engagement with all stakeholders.

Details on how we are approaching these challenges can be found throughout this sustainability report.

Any forecast set forth in this section speaks as of the date it was originally presented at the end of 2019. Alcoa is not updating or affirming any of the forecasts as of today's date. The provision of this information shall not create any implication that the information has not changed since it was originally presented.

Risk Management

Our risk-management process is structured around the Integrated Framework for Enterprise Risk Management from the Committee of Sponsoring Organizations of the Treadway Commission and uses the International Organization for Standardization's ISO 31000 (risk management) as a guideline.

We use the process to identify and evaluate a broad spectrum of risks. It is structured using our key business drivers and organizational goals to ensure that all aspects of the company have been covered. Business drivers include our reputation, brand, earnings and operating margins. Organizational goals include excellence in stewardship of the environment, health and safety, a consistently fair representation of financial information, organic growth and more.

The identified risks are grouped into categories and presented to management to determine how they should be prioritized. Our process is multi-dimensional and focuses on several aspects, each of which is considered in assessing, monitoring and prioritizing risk. In our process, particular emphasis is placed on the likelihood of occurrence, level of impact and mitigating factors, such as vulnerability and velocity.

The collaborative process by which risks are identified, evaluated and managed ensures that senior management remains aware and vigilant in managing key risks that could impact the company. The Alcoa Board of Directors maintains oversight of our risk management, and our management reports on specific risks on a periodic basis.

We also have in place additional risk management systems that are specific to particular business activities:

- **New facilities or expansion projects:** For new facilities or the expansion of existing ones, we conduct an environmental and social impact assessment (ESIA) to identify the project's potential risks and opportunities. This process involves significant stakeholder engagement, and the results of the assessment are available to the public. Our most recent examples of ESIAs conducted for greenfield projects are our Alcoa Fjarðaál smelter in Iceland (view report) and our bauxite mine in Juruti, Brazil (view report). At the Baie Comeau smelter in Canada, we conducted an ESIA prior to a retrofit to more advanced technology.
- **Human rights:** We perform human rights risk assessments and due diligence on a periodic basis at our locations. (See the Human Rights section.)
- **Environment, health and safety (EHS):** We have a systematic approach to EHS risk assessment and management at all locations. (See the Safety and Health section). All locations are also required to create an emergency response plan that is tested and shared with communities that potentially could be impacted.

A discussion of our significant risks can be found in our Annual Report on Form 10-K for the year ended December 31, 2019. Additional risks and uncertainties not presently known to us or that we currently deem immaterial also may materially adversely affect us in future periods.

Enhancing Product Value

Products

12 RESPONSIBLE CONSUMPTION AND PRODUCTION

8 RESPONSIBLE PRODUCTION

Aluminum is the element of possibility.

It is lightweight, durable and infinitely recyclable. It is used to make airplanes, cars, trucks, buses, trains and buildings more energy-efficient, helping to reduce greenhouse gas emissions over their life cycles. It enables lighter, fully recyclable food and beverage packaging, reducing waste.

In partnership with our customers, we continue to enhance the sustainability of our products. Our Centers of Excellence advance our knowledge and ensure continuous improvement through technology and engineering, best practice sharing and core operation standards.

In early 2020, we began selling bauxite, alumina and aluminum that is certified by the Aluminium Stewardship Initiative. We anticipate enlarging our offer of sustainable products in the coming year, certifying additional locations to ASI standards and developing additional value for our customers.

ASI CERTIFIED

CHAIN OF CUSTODY

Bauxite

We are one of the world's largest producers of bauxite ore, and we operate the world's second largest bauxite mine—the Huntly mine in Australia. Because our high-quality and reliable bauxite is mined responsibly and reliably, it helps reduce supply chain risk for any downstream user.

As part of our sustainability approach, we first engage with relevant stakeholders to develop a rehabilitation plan before mining operations

commence. We minimize operational impacts and use innovative techniques to restore biodiversity or prepare former mine lands for future beneficial use. See the Mine Rehabilitation section for more information.

Bauxite

Alumina

Outside of China, we are the world's leading producer of alumina, which is refined from bauxite ore. We are also the world's largest third-party

Alumina

supplier of alumina, which we produce with a portfolio of the lowest carbon emission refineries in the industry (0.6 metric tons of carbon dioxide equivalent emissions per ton of alumina produced).

Our sustainability challenges in refining are water usage, particularly in our three Western Australia refineries, and bauxite residue management. Information on how we are addressing each can be found in the Water and Waste and Spills sections.

Aluminum

Smelting

Smelting alumina to produce molten aluminum is an energy-intensive process that emits greenhouse gases, even when using current best-available technology. We have had significant success in reducing our absolute energy usage and GHG emissions, achieving 47 percent and 62 percent reductions, respectively, since 2005 when we were operating as Alcoa, Inc.

Molten aluminum

We are an industry leader in developing technology and implementing process controls to further reduce impacts from smelting. A recent example is ELYSIS™, which is a joint venture between Alcoa and Rio-Tinto. The unprecedented ELYSIS™ technology, first invented by Alcoa at our Alcoa Technical Center near Pittsburgh, eliminates all direct GHG emissions from the aluminum smelting process. It is the first industrial process that emits pure oxygen as its by-product. Apple purchased the company's first commercial batch of aluminum without any direct carbon dioxide emissions in 2019.

Casting

Our global network of casthouses produces a complete portfolio of primary aluminum products, including billet, foundry ingot, rolling slab, rod, powder, and high purity and P1020 ingot.

Our SUSTANA™ line of environmentally friendly aluminum products includes ECOLUM cast products, which are produced at Alcoa smelters that run on renewable power and generate no more than 2.5 metric tons of carbon dioxide equivalents (CO_{2e}) per metric ton of aluminum produced—one quarter of the industry average. The 2.5 metric tons of CO_{2e} encompasses direct and indirect emissions from smelting and casting, including from the energy consumed. The total footprint, which adds in emissions from the mining and refining phases, is well below 4 metric tons of CO_{2e} per metric ton of aluminum produced. Each ECOLUM product is issued a certificate that verifies its carbon emissions.

We also have developed an environmental product declaration (EPD) covering the ECOLUM™ family of cast products. The EPD, which is registered with UL, provides further information and validation of the products' total footprint. (View the EPD.) Customers using ECOLUM™ EPD data for development of their own EPDs for building and construction products can differentiate their products in terms of a lower lifecycle analysis (LCA) footprint compared to industry averages. Both LEED® and BREEAM® frameworks recognize better performance with additional points. This is especially useful for applications where primary metal is preferred to secondary metal.

Another offering in the SUSTANA™ line is ECODURA™ billet, which can be used in building and construction products. The billet has a minimum of 50 percent pre-consumer, post-industrial recycled content, not including internal scrap or primary remelt, and is produced with up to 95 percent less energy than virgin aluminum. ECODURA™ products also can contribute points toward LEED certifications.
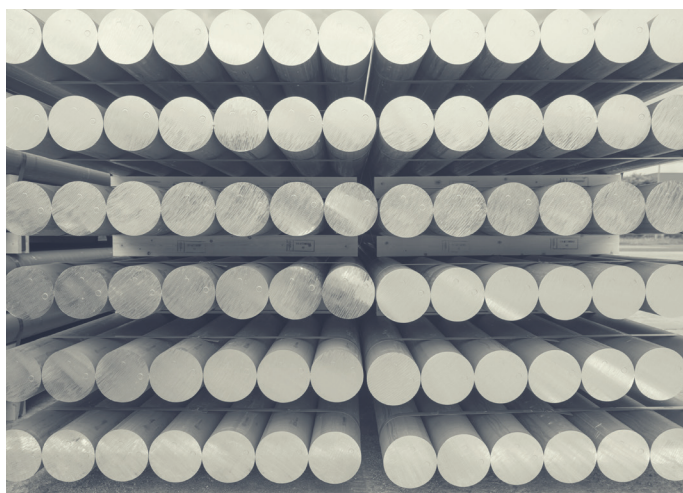
ECODURA™ billet

Another product family—Alcoa Specialty Alloys— brings environmental benefits while offering advanced mechanical or thermal properties for new lightweighting solutions. For example, EZCast-NHT™ alloy allows our customers to use cast parts, such as shock towers and battery trays, without additional heat treatment. This reduces costs, simplifies operations and requires less energy, resulting in lower GHG emissions.

Alcoa Specialty Alloys include SupraCast™, EZCast™, VersaCast® and EverCast™ alloys.

Rolling

Our flat-rolled aluminum is used by our customers to produce food and beverage containers, and we use aluminum scrap to supplement our own internal supply of metal to create can sheet. See the Recycling section for additional information.

Aluminum coil

Recycling

12 RESPONSIBLE CONSUMPTION AND PRODUCTION

8 RESPONSIBLE PRODUCTION

Aluminum can be recycled infinitely without losing its properties, making it the sustainable choice in many of the markets we serve.

According to the International Aluminium Institute's analysis, approximately 75 percent of all primary aluminum ever produced is still in productive use due to its strength, product life and recyclability. Producing primary aluminum from recycled content consumes about 5 percent of the energy required to make virgin aluminum and avoids up to 95 percent of the energy-related emissions.

We recycle aluminum in our casting and rolling operations, using both internal and purchased scrap. We also have closed-loop processes in place with customers, where aluminum scrap from their operations is returned to us for reuse. The recycled content excludes all internally generated scrap and re-melted primary ingot.

In our primary aluminum casthouses, we use purchased third-party and closed-loop scrap to produce our ECODURA™ billet. Part of our SUSTANA™ line of aluminum products, ECODURA™ billet has minimum of 50 percent pre-consumer, post-industrial recycled content, not including internal scrap or primary remelt, and is produced with up to 95 percent less energy than virgin aluminum.

In 2019, we consumed 167,000 metric tons of aluminum scrap in our global operations. The decline of 61 percent from prior year was due to the planned cessation of a portion of our tolling business and the divestiture of two minor assets.

Our ongoing focus on increasing the recycled content in the flat-rolled aluminum produced at our Warrick Operations in the United States resulted in 34.5 percent recycled content in 2019 compared to 30.4 percent in 2018. We again anticipate increasing this amount due to equipment upgrades and other initiatives that will continue through 2020.

In addition to recycling aluminum scrap, we actively seek to recycle or reuse our secondary materials. See the Waste and Spills section for additional information.

Our recycling efforts extend beyond our own operations to include partnerships with established recycling initiatives. In the United States, Alcoa Foundation continues to engage with The Recycling Partnership through financial support and representation on the organization's board of directors. The organization uses public-private partnerships to improve recycling at the local level.

The foundation's three-year commitment to The Recycling Partnership's All In On Recycling Challenge helped support numerous projects, including the program's expansion to more than 38,000 households in central Ohio during 2019. A before and after study to measure the capture of recyclables within these households showed a 111 percent increase in aluminum and a 22 percent increase in PET bottles.

With Alcoa Foundation and Alcoa Corporation support, The Recycling Partnership has expanded its reach to 390 additional communities across the United States, bringing its cumulative total to more than 1,500 communities. Its work in 2019 eliminated an estimated 76,000 metric tons of carbon dioxide, saved 519,000 cubic meters (137 million gallons) of water and collected more than 33,264 metric tons of recyclables.

Checking the quality of recycling

Photo credit: The Recycling Partnership

Shared Value Creation

3 GOOD HEALTH AND WELL-BEING

4 QUALITY EDUCATION

5 GENDER EQUALITY

6 CLEAN WATER AND SANITATION

8 DECENT WORK AND ECONOMIC GROWTH

17 PARTNERSHIPS FOR THE GOALS

9 SOCIAL PERFORMANCE

One of the three pillars of our sustainability strategy is to create sustainable value for the communities where we operate.

A key component of this pillar is stimulating economic activity at the local and regional levels to enable improved quality of life for our employees and neighbors. We do this by providing stable, fair-paying jobs, procuring goods and services from local suppliers when possible, paying income and other taxes, and investing in community infrastructure and initiatives.

Guiding our value-creation efforts with local and regional stakeholders are our Values, Ethics and Compliance Program and Human Rights Policy. These are also the foundation of our efforts to provide a higher quality of life and well-being for our employees, professional development opportunities and a work environment that is inclusive and shaped by industry-leading health and safety programs.

Our long-term goal for sustainable value creation is to reassess the implementation of key stakeholder engagement tools by 2020 and define shared value creation opportunities to be implemented by 2025 and 2030. We advanced this goal in 2019 through the following initiatives:

- After deploying the enhanced Alcoa Stakeholder Engagement Framework in 2018, we decided to further our understanding of changing community expectations in our operations in Western Australia through a stakeholder perception survey. (See the Stakeholder and Community Engagement section for details.)
- We fully deployed a new Global Supplier Sustainability Program with a more robust due diligence process to reduce our supply chain risk. We also joined forces with other companies in Brazil to develop a supplier base to increase local procurement activities and contribute to economic development. (See the Supply Chain section.)

- We published a new Human Rights Policy aligned with the United Nations Principles for Business and Human Rights and the International Labor Organization Core Conventions. We also performed human rights due diligence in Australia and Brazil and human rights risks assessments in Canada, Spain and Norway. (See the Human Rights section.)

"I thank God for the opportunities that I and the Cabral Miranda community have always had with Alumar. The agriculture project contributed significantly to the families who live here. Alumar's support of the Partnership Project, which generates employment and income, was a wonderful project for which the community is very grateful. We are eternally thankful for the doors that have been opened for us. Thank you, Alumar, for contributing to, and making a difference in, our communities!"

Antonio José da Rocha Paulo
President
Cabral Miranda Residents Association

Sharing the value created by our presence helps communities thrive and earns us access to the resources we require to manufacture our products.

To continue creating shared value, we have reviewed our long-term goal for this area and have committed to implementing a comprehensive social management system across our locations by 2022. This will allow us to define metrics and measure progress in a range of socio-economic indicators that are relevant to interactions with our hosting communities.

2019 Alcoa Economic Value

	Australia	Europe	North America	South America	Total
Labor Costs *(US$ billions)*	0.5	0.3	0.7	0.1	**1.6**
Procurement Spend *(US$ billions)*	1.8	2.1	3.7	1.2	**8.8**
Income Taxes *(US$ millions)*	683.0	40.0	(8.1)	17.2	**732.1**

Labor costs include compensation and benefits for employee services rendered plus employee expenses for external training, transfer and relocation, expatriate costs, workers' compensation, travel, recognition and rewards, medical expenses, meals, recruitment, transportation, education, work clothes and other employee-related expenses. Income tax amounts are net of income tax refunds received and exclude various other taxes.

2019 Alcoa Foundation Investments

	Cash *(Millions of U.S. dollars)*	Employee Volunteer Hours
Australia	1.2	2,539
Europe	1.0	1,176
North America	1.3	2,448
South America	0.6	3,836
Global Outreach	1.9	n/a
Total	**6.0**	**9,999**

Europe includes Africa. Alcoa Foundation does not make in-kind contributions. Management overhead in 2019 was $668,057.

Additional details on our 2019 financial performance can be found in the 2019 Alcoa Annual Report.

Mineral Revenues

As a signatory to the Extractive Industries Transparency Initiative (EITI), we support enhancing the transparency of mineral revenues. We believe that engaging with and supporting governments that implement EITI's principles helps to ensure mining revenues are used appropriately to address a host country's and host community's social needs.

During 2019, we had four active bauxite mining areas in Australia and Brazil and one active coal mine in the United States, which was fully curtailed in April 2019. We also have minority interests in bauxite mining activities in Brazil, Guinea and Saudi Arabia, but those non-controlled joint ventures are not included in this report.

Learn more on the Alcoa section of the EITI website.

2019 Mining Royalties Paid
Millions of U.S. dollars

Country	Royalties
Australia	65.3
Brazil	9.9
United States	0

Mining Partnerships for Development

Our locations and Alcoa Foundation partner with numerous non-governmental and community-based organizations on social, environmental and economic development activities in our host communities.

CASE STUDY

People's Market Connects Rural Producers with Customers

Every other Wednesday, a unique social partnership occurs at our Alumar operations in Brazil. Small, rural producers seeking a broader customer base connect with our employees, who want a more convenient way to shop for fresh food and other items.

Established in October 2019 at Alumar's bus station, the People's Market provides a venue for around 50 vendors from 15 communities surrounding the plant to sell their goods on a rotational basis. Products for sale include fruit, vegetables, cakes, jellies, honey, manioc flour and handicrafts.

"The market allows me to generate extra income that has helped my family pay bills and purchase school supplies and food, among other things," said Maria da Piedade dos Santos Sousa, who sells fruit, vegetables, flour and free-range eggs. "My quality of life has improved a lot, because I have more opportunity to get to know others and also to learn how to improve the products that I produce. I am delighted to participate in yet another Alumar project."

In Brazil, for example, Alcoa Foundation has partnered with Centro de Empreendedorismo da Amazônia to create an entrepreneurship training program for youth and young adults in the Juruti region. The three-year program aims to awaken and support the development of sustainable business ideas with a focus on forestry, biodiversity, agroforestry, sustainable agriculture, fishing and more.

The Alcoa Sustainable Communities Funds invests C$1 million each year in Canada for projects in the Baie-Comeau, Bécancour and Deschambault-Grondines/Portneuf regions in the province of Québec. A unique governance structure fully engages the communities, and funded projects begin with ideas submitted through citizen forums. Each regional sustainable development committee prioritizes these ideas, which are implemented by citizens, municipalities and local organizations from each community. Since its creation in 2011, the fund has supported nearly 100 projects and invested approximately C$8 million.

Taxes

In addition to the economic activity we stimulate at the local and regional levels, we also contribute to the communities in which we operate through a variety of tax payments.

Our corporate tax policies and strategy closely follow our financial and ethical policies and guidelines. In addition, our finance and code of conduct policies provide robust guidelines for our tax professionals to follow.

We observe all applicable tax rules and regulations in the jurisdictions where we have a tax presence. We work closely with local governments to ensure transparency, and we participate in current audit initiatives to shorten audit cycles and reduce tax risk. We have a number of tax procedures to ensure our senior management understands the tax consequences of all material company transactions, audit settlements and other material tax matters globally.

Our tax professionals partner with our businesses and resource units to provide proactive, efficient tax services to:
- Satisfy all income tax reporting and filing obligations in accordance with laws and regulations at a competitive cost;
- Develop and implement tax strategies to support business goals and maximize stockholder value;
- Mitigate tax risk through thoughtful implementation and documentation, proactive involvement in legislation and engagement in transparent, current audit programs with local governments; and
- Assist in developing sustainable, arms-length pricing on intercompany transactions.

CASE STUDY

Portrait of a Good Neighbor

Whenever Kevin Carter can use his skills as an attorney to help people, he does not hesitate.

"I am part of my community, and I feel it is imperative that I help people who have not been as fortunate as I have been," said Kevin, employment counsel for Alcoa. "I'm proud to work for a company that also values and supports community service and strives to be a good neighbor."

Serving on the recruiting subcommittee of the Pittsburgh Legal Diversity & Inclusion Coalition, of which Alcoa is a founding member, Kevin helps the Pittsburgh legal community increase the hiring, retention and inclusion of diverse legal professionals. He is also a member of the steering committee for the Greater Pittsburgh Workplace Diversity & Inclusion Forum, which influences organizations to prioritize diversity and inclusion as a strategic imperative. Alcoa also supports Kevin's pro bono work in handling landlord and tenant issues for people who do not have the means to get legal counsel.

"Alcoa is in communities where we can really make a positive impact," Kevin said. "These communities do a lot for us, and we do a lot for them. That's called being a good neighbor."

Kevin Carter

Transfer of Knowledge and Best Practices

As a sustainability leader, we continuously seek opportunities to assess and influence the sustainability of our suppliers (see the Supply Chain section) and partners.

We review and monitor the compliance programs of significant joint ventures where we are not the controlling shareholder or operator. Under this program, a steering committee composed of senior Alcoa executives provides oversight to local teams charged with reviewing and monitoring the ethics and compliance practices of the joint venture.

These reviews are conducted in collaboration with the joint venture partners and focus on key compliance program components, including:

- Commitment from senior management;
- Oversight, autonomy and resources for compliance;
- Code of conduct, anti-corruption and other compliance policies and procedures; and
- Ethics training, confidential reporting and investigations.

Our teams work with our partners to ensure alignment around the compliance programs for the joint venture and develop plans to close any identified gaps. As part of the process, we also share our policies, procedures and best practices.

We extended our human rights risk assessment to our non-controlled joint ventures in late 2019, requesting each to complete a questionnaire covering the main topics

"Since 1902, Massena has been an aluminum community, with Alcoa part of the fabric of that community. Alcoa employees are members of our families, friends and neighborhoods. Their volunteer efforts and monetary support through ACTION grants and Alcoa Foundation help us improve and move Massena forward."
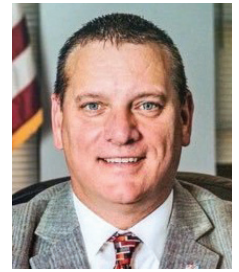
Timothy Currier
Mayor
Massena, New York

assessed. In 2020, we will begin working with specific joint ventures to address any identified gaps.

In addition to compliance and human rights, we take an active role in transferring our best practices in environment, health, safety and human resources to our non-controlled joint ventures. The level of involvement varies based on the maturity of processes and systems as well as identified risks of each partnership. Our involvement ranges from sharing our best practices and standards to temporarily assigning Alcoa experts to the joint venture. We also conduct risk assessments of various aspects of a joint venture when warranted.

In November 2019, we created the role of vice president of joint ventures to manage and develop our key strategic relationships and maximize the value of non-controlled joint ventures for all stakeholders.

Stakeholder and Community Engagement

We believe it is important to have transparent and regular communications with identified stakeholders to ensure a mutual understanding of issues, concerns and opportunities.

We define a stakeholder as any person or organization that directly impacts, or is impacted by, our activities. This includes stockholders, employees, customers, suppliers, government representatives and regulators, non-governmental organizations, local communities and the media.

Our stakeholder relationships are both formal and informal. With customers, suppliers, governments, employees and stockholders, we typically have formalized, contractual or even legally mandated channels for engagement. Our interaction with other stakeholders is typically less formalized and requires attention to ensure that it is nurtured on a regular basis.

All of our operating locations are guided by the Alcoa Stakeholder Engagement Framework, which ensures that we are actively interacting with our stakeholders to achieve mutual success. It provides a systematic process to first identify appropriate stakeholders and then engage with them in the most effective manner, ensuring transparent and ongoing dialogue.

As part of this framework, our locations are encouraged to form community consultation forums comprising a relevant cross-section of local stakeholders. These forums provide an opportunity for regular two-way communication between Alcoa representatives and community members on topics of mutual interest.

We also engage with stakeholders, primarily local communities and non-governmental organizations, through Alcoa Foundation globally and Instituto Alcoa in Brazil. The method of engagement varies by location. Some do so through their community consultation forum, while others

"The National Wildlife Federation is committed to connecting future generations with nature at home, at school and in the community. Alcoa Foundation has been a great partner in our work to inspire the next generation of conservation champions. Together, we have engaged more than 20,000 kindergarten through 12th grade students since 2015, helping them develop their science, technology, engineering and math skills and empowering them to utilize these skills to assess, design and build innovative environmental solutions."

Collin O'Mara
President and CEO
National Wildlife Federation

consult with employees, local leaders, institutions or regional associations. The aim is to understand stakeholder needs and contribute to the social, economic and institutional development of our host communities.

In Brazil, we conduct periodic Alcoa and Community Panels to monitor the impact of community projects supported by Alcoa Foundation and Instituto Alcoa.

Students from Instituto Semear, which is supported by Instituto Alcoa, perform at the Poços de Caldas community panel.

We held the seventh panel in Poços de Caldas in 2019 to review projects implemented with 23 local organizations from 2015 through 2017.

To better understand the perceptions and expectations of host communities and key stakeholders regarding our Western Australia operations, we conducted a perception survey in 2019. We engaged more than 800 stakeholders, including community members, through telephone and online surveys and in-depth interviews. The survey identified both strengths and opportunities for improvement, which our Western Australian business will consider throughout 2020.

Stakeholder engagement is also a key part of our human rights due diligence process, where individuals are given the opportunity to provide input on their relationship with the company and the functioning of the established grievance mechanisms. Any stakeholder can raise issues or lodge a grievance using our confidential Integrity Line. (See the Governance, Ethics and Compliance section.)

The following key issues were raised by, or discussed with, stakeholders in 2019.

2019 Stakeholder Issues

Location	Issue	Action
Anglesea, Australia	Following the permanent closure of our Anglesea operations in 2015, there has been significant interest in the future of the site, including the decommissioning, remediation and land planning processes underway. In May 2019, Alcoa and Eden Project International, an educational and environmental charity and social enterprise based in the United Kingdom, released the Eden Project Anglesea Concept for a world-class eco-tourism attraction within the former mine site. While overwhelming support was received for the concept from community members and stakeholders, a number of concerns were constructively raised that will be addressed. These include the impact of a potential increase in Anglesea's traffic and questions about how water will be sourced to complete the project's water element.	Community engagement is a key component of the Anglesea project. The strategic engagement program aims to keep the local community and key stakeholders informed of, and engaged in, our activities to ensure feedback from the community is considered in decision-making. In May and June 2019, we undertook extensive community consultation to gain feedback on the proposed concept, which brings to life the guiding principles we developed in partnership with the Anglesea community in 2016 to shape the transformation of the site. During the six-week period, we had more than 5,000 contacts with interested parties via events, roundtables, briefings, feedback forms, surveys, conversations, mailouts, website visits and media engagement. In August 2019, we released the community engagement report and continued engagement via community, stakeholder and government meetings and events. We also held six Alcoa Community Consultative Network meetings throughout the year. Our community engagement program will continue in 2020 with two key issues to be resolved before the project can progress. They are agreement on the strategy to fill and maintain the water body and a determination of the planning authority and a defined rezoning process.
Kwinana, Australia	Since the Western Australian Planning Commission (WAPC) adopted the Kwinana air-quality buffer in September 2010, there have been litigation and questions on the legitimacy of the buffer and land uses in the area. In April 2019, the Minister for Planning announced an improvement plan (IP47) for the Mandogalup area near Kwinana. This process has not yet commenced.	We support compatible development in the Mandogalup area with adequate separation between industry and residential development. During 2019, we supported a Special Control Area (SCA) application that was led by the Kwinana Industrial Council (KIC). The application advocated the WPAC apply additional development conditions in the Kwinana Industrial Area. WPAC rejected the initial SCA application, and the KIC then submitted a follow-up application. Further updates are pending on the IP47 process as well as the technical investigations and formulation of development scenarios that are scheduled to occur between October 2019 and October 2020.

2019 Stakeholder Issues

Location	Issue	Action
Western Australian Mining and Refining Operations	In response to the expiration of the 2014 Australian Workers' Union (AWU) Australian Enterprise Bargaining Agreement (EBA), we continued to negotiate a new, modern agreement to enable more efficient and productive operation of our Western Australian mines and refineries and to improve our ability to respond to market conditions. In April 2019, the Full Bench of the Fair Work Commission (FWC) upheld the AWU's 2018 appeal of the FWC ruling to terminate the expired EBA. It sent the matter back for redetermination by the same FWC deputy president who had heard the original application to terminate. In November 2019, employees voted in support of a new proposed EBA. In December 2019, the FWC ratified the EBA. It came into effect December 23, 2019.	Our direct engagement with AWU members included good faith negotiations, briefings and written communications. Upon learning of the successful vote, our management communicated its commitment to work together with AWU members to build trust. Throughout 2019, we also communicated with employees and engaged stakeholders to inform them of the status of the issue as developments occurred.
Western Australian Mining Operations	As part of our ongoing work to establish connection to, and create sustainable value for, the communities where we operate, we continued to consult with current and future communities to understand and address their concerns, where practical.	We are a key stakeholder in Dwellingup Futures, a consultation group comprising local and state government, industry and community group representation. The group's Terms of Reference were ratified in 2019, and specialist consultants were engaged to prepare a road map for long-term economic, environmental and social considerations. In the Larego mine region, construction commenced in preparation for 2021 mining. Discussions continued with future neighbors and key stakeholders. Ongoing engagement also continued with key community stakeholders in Jarrahdale as we develop plans for future mining that will start around 2025 to the south of the town in the Myara North mine region. We continued one-on-one communication with interested neighbors and community members for current operations.
Juruti, Brazil	Since 2018, the Federal Public Prosecution of Santarém and the Federal Court of Santarém prohibited us from carrying out any mining and community relations activities in the Lago Grande region in Santarém. We have not conducted any mining activity in the area since 2008, and we suspended community relations activities in 2018.	In 2019, we continued to engage with key stakeholders to keep them informed about the situation and to seek community approval to restart our mining exploration.

2019 Stakeholder Issues

Location	Issue	Action
Juruti, Poços de Caldas and São Luís, Brazil	The collapse of another company's tailings dam in Brumadinho, Minas Gerais, raised concerns among local stakeholders in our Brazilian communities about the management of bauxite mine tailings and residue storage areas.	We expanded the number of government and community stakeholders that we invited to our Brazilian operations to further detail our tailings and residue storage management processes and explain the differences between our processes and those used in Brumadinho. We also increased our dialogue with stakeholders by hosting several site visits and community consultative forums to show how we manage our sites. In addition, we engaged with local authorities on response plans.
Juruti, Brazil	In October 2019, the Association of Communities of the Juruti Velho Region (ACORJUVE) issued a letter preventing Alcoa from developing social activities in Juruti Velho and surrounding communities. This followed ACORJUVE's decision to not follow an agreed-upon path to create a foundation to manage the royalties that Alcoa pays to ACORJUVE to ensure transparency and good governance.	We held a meeting with the National Institute of Colonization and Agrarian Reform (INCRA) and the state and federal prosecutor offices regarding the situation. INCRA has taken a firm position to complete the foundation process and also maintained authorization for us to carry out environmental control projects. We continue to engage with ACORJUVE and the affected communities regarding resuming activity in the region.
Juruti, Brazil	The Prudente community was concerned that one of its access roads would be blocked because of its location near our new authorized mining area. The community asked for support to build an alternative road.	We signed an agreement with the city and received an environmental license authorizing the road's construction, which began in 2020.
Poços de Caldas, Brazil	We determined that a bauxite residue storage area, known as RSA3, at our Poços de Caldas site needed reinforcement based on the findings of a third-party auditor. We proactively reported the finding to FEAM, which is the state environmental agency.	After consulting with FEAM, we initiated improvements to RSA3 in September 2019. These included additional geotechnical investigations, equipment and reinforcement berms downstream of the existing berms. The work is expected to take about six months, and an alternative residue storage area is being used during this planned work without any impact on operations.
Poços de Caldas, Brazil	Residents of the Divinolândia community raised concerns about the high volume and route of trucks hauling bauxite.	We engaged with government officials and residents to identify a solution. We improved the road that the trucks use and changed routes to eliminate heavy vehicle traffic. We also made improvements to public areas impacted by the activity.
São Luis, Brazil	On two occasions, residents of the Coqueiro community reported a strong odor similar to burnt oil, which was more intense at night. Residents showed symptoms, including nausea and headaches.	The day following receipt of the first complaint, we sent representatives to the community to obtain additional information. During the visit, residents raised other issues concerning fly ash (carbon dust), noise (early evening and early morning) and bauxite dust during the dry season. As a result of the investigation, we: • Conducted a noise measurement that showed sound pressure levels around the Alumar facility were in compliance with legal limits. • Checked the coal-burning process and purchased a different type of coal to reduce spontaneous combustion.

2019 Stakeholder Issues

Location	Issue	Action
São Luis, Brazil *(continued)*		• Established a dedicated team to quickly address spontaneous combustion of the coal. • Analyzed vegetation identified by the community as being impacted by our operations. The samples did not have caustic residue deposited on their surface, meaning they were not impacted by ash from Alumar's operations. • Visited the community during the dry season to detect particulate matter. None was found. Residents had no additional reports of odor in 2019. The report that we sent to the state environmental agency indicated there was no evidence that our operations were the source of the odor.
Bécancour, Canada	The collective bargaining agreement for the Bécancour smelter (ABI) expired in November 2017. After the union rejected management's best and final proposal for a new collective bargaining agreement, ABI locked out unionized employees on January 11, 2018, to avoid safety hazards and protect the asset due to instability that developed during the negotiations.	ABI reached agreement with the union in July 2019. The signing of a six-year collective bargaining agreement prompted the smelter's restart. During the 18 months of lockout, ABI management kept key community and government stakeholders abreast of the issue, addressed concerns and expressed its objective to improve the facility for the long-term.
Baie-Comeau, Canada	The collective bargaining agreement between the Baie-Comeau smelter and its unionized employees was renegotiated in 2019.	The smelter reached agreement with the union on a new six-year collective bargaining agreement in May 2019.
Avilés and La Coruña, Spain	In October 2018, we announced the initiation of a collective dismissal process at our smelters in Avilés and La Coruña, which were the least productive of our smelters.	On January 16, 2019, we reached an agreement with the workers' representatives as part of the collective dismissal process. In addition to a social plan that included severance and early retirement packages, the agreement kept jobs in place until July 31, 2019. During that period, a process aimed at selling the plants was conducted. The potential buyer would have to keep the entire workforce (approximately 630 employees) and could present a reindustrialization project as an alternative to the restart of the smelters. In July 2019, PARTER Capital Group AG, based in Switzerland, acquired our Spanish subsidiaries that owned and operated the Avilés and La Coruña plants. The acquisition included the casthouses at both plants and the paste plant at La Coruña, all of which were in operation, and the curtailed smelters at both plants. Under terms of the agreement, PARTER Capital Group will maintain the facilities' entire workforce for a minimum of two years. The company also proposed reindustrialization projects for both sites and a potential restart of the plants' smelting capacity. This transaction completed the collective dismissal agreement.

2019 Stakeholder Issues

Location	Issue	Action
Boonville, Indiana (USA)	Residents near our Liberty coal mine expressed concern about possible expansion of the mine, which provided fuel for the power plant at our Warrick Operations. The mine's reserves under an existing permit were approaching exhaustion.	We engaged with city officials and a coalition of residents on potential protections, such as a buffer zone and seismic monitors. Although an agreement was reached in November 2018, the lengthy negotiations required us to source coal from third-party suppliers. In April 2019, we announced the full curtailment of operations at Liberty mine.
Intalco Operations, Ferndale, Washington (USA)	Our Intalco Operations is reaching the conclusion of a three-year monitoring program for sulfur dioxide (SO_2) in association with the National Ambient Air Quality Standards (NAAQS). The location is also preparing for upcoming compliance with regional haze standards.	In anticipation of the upcoming compliance standards, Intalco worked with the Washington Department of Ecology to enter into an agreed order to install and begin operating one wet SO_2 scrubber by the end of 2022. The order was submitted for public comment by community stakeholders before being finalized.

Non-governmental Organization Engagement

Non-governmental organizations provide significant value to society. We partner with these institutions to support and advance their work in areas that our stakeholder engagement process has identified as important. We have a special focus on two areas that are material issues for our operations—preventing climate change and preserving biodiversity in the communities in which we operate.

Examples of recent partnerships can be found throughout this report and on the Alcoa Foundation website.

Memberships

The following are some of the organizations in which we are a member or participant:
- Aluminium Association of Canada;
- Aluminium Stewardship Initiative;
- Australian Aluminium Council;
- Brazilian Aluminum Association;
- European Aluminium;
- International Aluminium Institute;
- International Council on Mining & Metals; and
- The Aluminum Association.

Through these organizations, we engage with numerous stakeholders on issues important to the aluminum and mining industries.

A Growing Partnership

Hundreds of thousands of trees around the world are now helping conserve biodiversity and mitigate climate change, all of which was made possible by a long-term partnership between Alcoa Foundation and American Forests.

Since 2011, the partnership has engaged our employees, communities and partner organizations in championing forest restoration around the world. The latest three-year iteration of the partnership, which ended in 2019, resulted in 7,000 volunteers restoring 121 hectares (300 acres) of forest by planting 230,000 trees. These trees will capture 1,300 metric tons of carbon dioxide equivalents each year as they grow. The partnership also supported the collection of 35 kilograms (78 pounds) of seed, which is enough to produce 140,000 endangered trees.

In Spain, more than 650 employee and community volunteers planted 6,700 trees under the guidance of local partner Ecoherencia SCA. Their efforts helped restore rare native forest patches around a newly discovered cultural heritage site and also reclaimed parking lots in Guadarrama National Park.

Volunteers plant trees along the Nooksack River in the U.S. state of Washington.

"Sustainable forest management is one of the main objectives that we have defined within the environmental policy of the Cervo City Council," said Manuela Méndez, councilor for the environment for the municipality of Cervo. "Being part of the Alcoa Foundation and American Forests project has helped us comply with the roadmap that we have created. For future generations, great forests provide a heritage of incalculable value, both in the landscape and productive sense."

Pockets of native Atlantic Forest have sprouted in urban areas surrounding our location in Poços de Caldas, Brazil, with the help of our employees and community partners through the Floresta de Bolso program. In the U.S., the Nooksack Salmon Enhancement Association coordinated the planting of 22,000 trees by more than 5,000 volunteers from our plants and the surrounding communities to cool waterways that endangered salmon need to spawn.

Human Rights
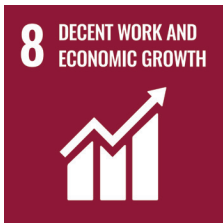
At Alcoa, values have always been the foundation of our company. They govern the way we act, operate and interact with our customers, suppliers, communities and each other. Respect for human rights and the interests, cultures, customs and values of employees and communities is embedded in that foundation.

Our commitment to support the United Nations Guiding Principles for Business and Human Rights and the International Labour Organization Core Conventions are included in our new Human Rights Policy, which we published in early 2019. We strive to ensure this commitment is exemplified by our actions and those of each employee, supplier and business partner. Upon notification of any potential violations to our policy, we act quickly and decisively.

Our Human Rights Policy operates in conjunction with the following:
- The Alcoa Code of Conduct and our employee training, both of which cover human rights;
- Our Supplier Standards, which explicitly indicate respect of human rights;
- Internal and third-party supplier assessment programs for new and existing suppliers (see the Supply Chain section);
- Our Equal Employment Opportunity Policy;
- Our Harassment and Bullying Free Workplace Policy; and
- Our Integrity Line for employees, suppliers and the general public to report potential violations.

The Alcoa Human Rights Council defines and implements management systems that enable us to respect and support individual and collective human rights affected by our operations. The council is sponsored at the executive level of Alcoa and includes representatives from each region and key resource unit.

In 2019, we completed human rights risk assessments at our Juruti mine (Brazil), Baie Comeau smelter (Canada), San Ciprián refinery (Spain) and Mosjøen smelter (Norway) following the methodology of the Danish Institute for Human Rights. The assessment results did not show any areas of very high concern. However, the results identified potential risks related to corruption and contractor labor conditions in Brazil and limited surveillance of contractor compliance with human rights in Brazil, Canada, Norway and Spain. We are looking into these issues to ensure that our internal systems are strong to prevent any human rights abuses in those countries.

We also completed human rights due diligence—which is more in-depth analysis and stakeholder engagement—at our two mines and three refineries in Western Australia and our Alumar refinery in Brazil during 2019. We selected the Alumar site due to the region's higher level of intrinsic risk, and the Western Australia sites due to their significant contributions to Alcoa's financial performance.

At our Western Australia operations, the due diligence identified improvement opportunities for greater consistency with the globally recognized standard of Free Prior and Informed Consent, as well as impacts on the environment and cultural traditions.

We undertook a separate risk assessment of the human rights and modern slavery risks in our Western Australia operations and supply chains during the year. Alcoa of Australia will deliver its first Modern Slavery Statement prior to the June 30, 2021 deadline in accordance with the reporting requirements of the Modern Slavery Act 2018 (Cth). The act aims to combat modern slavery in global supply chains by requiring companies like Alcoa to explain the actions we have taken to assess and address modern slavery risks in our Australian operations and supply chains.

The due diligence at our Alumar location indicated risks related to impacts on surrounding communities and improvements regarding the management of critical suppliers. In response, we conducted onsite visits and provided human rights guidance for select suppliers in 2019.

The identified risks for both operations have been integrated into an action plan that is overseen by the Alcoa Human Rights Council. Progress is reported to high-level management on a periodic basis.

Incorporating the human rights program into a comprehensive management system is the council's priority for 2020. Systematization of due diligence practices, reinforcement of grievance mechanisms, and increased internal and external awareness will be at the core of the working plan.

Security can be one of the highest risks to human rights in an Alcoa operation, as our host communities and employees may interface with private and public security providers who are in charge of local protection. To ensure we respect human rights of all people in this space, we have a security standard and contracts with private providers. We are committed to developing assurance processes consistent with the Voluntary Principles on Security and Human Rights.

In 2020, we will further enhance our human rights practices based on the principles and position statements of the International Council on Mining and Metals. We were accepted as a member of ICMM in 2019.

Indigenous Peoples

We recognize and respect the diversity, cultures, customs and values of Indigenous Peoples (tribal peoples, first peoples, native people and aboriginal people), and we acknowledge their needs, concerns and aspirations regarding their heritage and traditions. (Read our Indigenous Peoples Statement.)

Our locations with the most direct impact on Indigenous Peoples are our operations in Australia, our Juruti mine in Brazil and our former mining and refining operations in Suriname.

Australia

For more than half a century, Alcoa has worked with Aboriginal and Torres Strait Islander peoples in the communities in which we operate in Australia. We developed our inaugural Reflect Reconciliation Action Plan (RAP) in 2019, formally embedding our commitment to not only continue this work but also strive for continuous improvement. We launched the plan in February 2020 with formal endorsement from Reconciliation Australia.

The RAP framework will guide our evolving approach to Aboriginal and Torres Strait Islander engagement, focusing on the pillars of education, economic participation and community engagement.
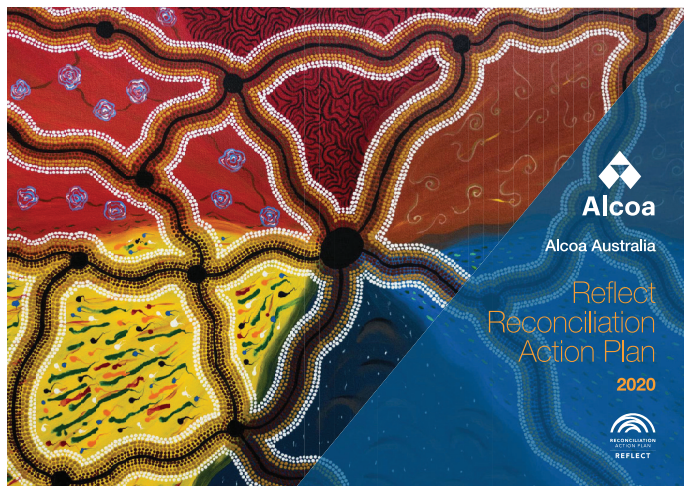
Download the plan.

Juruti, Brazil

We have engaged with the traditional community of Juruti Velho, located at Vila Muirapinima, since the inception of the mine, which is located in the Amazon. Juruti Velho has a population of approximately 9,900 people (21 percent of the overall municipality of Juruti) and encompasses 56 settlements located near the site where we started mining bauxite ore in 2009.

Alcoa, the National Institute of Colonization and Agrarian Reform (INCRA) and the Association of Communities of the Juruti Velho Region (ACORJUVE) have an established negotiation process on land use for mining and community. ACORJUVE is the formal organization that represents the Juruti Velho community, including landowner rights. The Brazilian federal and state governments also have participated in the negotiations.

In February 2018, ACORJUVE, INCRA, federal and state prosecutors and Alcoa signed a social, environmental and economic agreement on common land use, shared value and sustainable mining in the Amazon region. This followed a comprehensive study to evaluate compensation for loss and damages that was completed in late 2014.

The agreement requires Alcoa to pay US$5.3 million in compensation for the 2006 to 2010 period. The parties

agreed that this amount and the royalties paid to ACORJUVE would be managed by a foundation to ensure transparency and good governance in accordance with recommendations issued in February 2015 by federal and state prosecutors.

In the third quarter of 2019, the representatives of ACORJUVE decided not to follow the agreed-upon path to transition proceeds to the foundation. Alcoa and the other participants in the negotiations urged the association to continue engaging in dialogue with the expectation of completing the foundation's by-laws as soon as possible in 2020.

From mine startup in October 2009 through December 2019, Alcoa paid US$23.92 million in royalties to ACORJUVE.

Suriname

In Suriname, we ceased all mining activities in 2015 and permanently closed the Paranam Alumina refinery in 2016.

Since the curtailment of production, we have been negotiating closure requirements with a committee appointed by the country's president. In August 2019, the Suriname Parliament approved a set of agreements defining detailed requirements for environmental remediation and mine rehabilitation.

Consistent with those agreements, we are developing closure plans for the remaining mine sites that require rehabilitation in the Para district. In 2019, we completed and further calibrated a re-vegetation index that will serve as the outline for re-vegetation success monitoring.

We engaged with the Kaliña and Lokono indigenous communities in 2018 regarding past mine rehabilitation efforts at Wane Hills in the Marowijne district. In 2019, the National Association of Indigenous Village Leaders in Suriname (VIDS) and the Organisation of Kaliña and Lokono in Marowijne (KLIM) sought additional input from their communities on how to further implement restoration activities for the areas disturbed during the mining period. We received the final report in December 2019 and will evaluate additional measures that can be considered based on the input received.

KLIM community consultation

Our People

We are on a mission to build a stronger everyone culture—where our Values drive everyday decisions, and employee development is seen as a catalyst for continuous improvement, increased engagement and breakthrough performance.

Diversity, Inclusion and Employee Experience

We seek to provide a trusting workplace that is safe, respectful and inclusive of all individuals and that reflects the diversity of the communities in which we operate.

Whether on the shop floor or in our offices, the intent of equality, diversity and inclusion is to ensure that everyone has access to the same opportunities and fair treatment while feeling valued and accepted. This is the foundation for an everyone culture, where employees feel empowered to build solutions through coaching and collaboration.

Our primary focus is to move from aspirations to intentional actions that are impactful in advancing diversity, inclusion and equity. Recognizing this will be a multi-year journey, our key focus areas are diversifying our applicant pool, diversifying hiring and promotions, and improving our employee experience to retain diverse employees. We will

Impact Measures

Diversify representation
and improve inclusion and employee experience
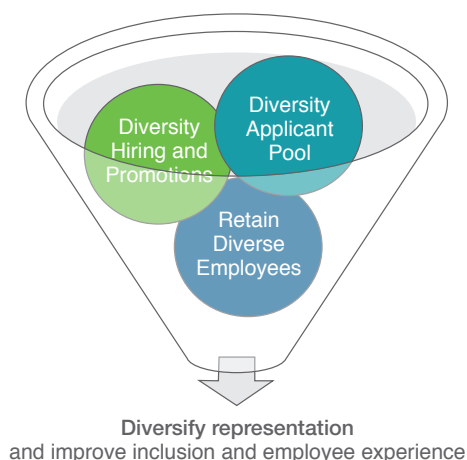
Our Definitions

Diversity means all the ways that we differ.

Inclusion is how we respect and leverage these differences to achieve our goals.

Equity is ensuring everyone has access to the same opportunities and fair treatment.

Cognitive diversity or thinking differently impacts creativity and problem solving and is shaped by valuing unique backgrounds, experiences and perspectives.

measure our success through the percentage of diverse applicants, hires, promotions and retained employees.

The most impactful actions are those that influence decisions at the local level. In 2019, our locations embarked on a variety of promising practices:

- **Intalco Operations in Bellingham, Washington, USA:** The location launched a Women in Operations video aimed at diversifying the talent pool by showcasing the range of roles women hold, from accounting to engineering and production. The video had more than 18,000 views by the end of 2019, with the location experiencing a 15 percent increase in the number of job offers to women.
- **Willowdale mine in Western Australia:** Limited opportunities for hiring made diversifying the mine's workforce challenging until the location explored employee interest in job sharing. This arrangement was ideal for some employees transitioning to retirement and others who preferred part-time work.
- **Alcoa Corporate in Pittsburgh, Pennsylvania, USA:** Diversifying the legal profession has not only been a challenge in our company but also in the city of Pittsburgh.

We joined 40 local organizations to learn from each other and pool resources to increase the hiring, retention and inclusion of diverse legal professionals.

- **Alcoa Fjarðaál in Iceland:** The location took a unique approach to addressing the #MeToo movement by holding gender-based meetings for all employees to discuss what makes a good workplace culture. The meetings resulted in a covenant among employees to individually commit to a good workplace culture within Alcoa Fjarðaál. In addition, the location co-hosted an external conference on gender equality in the workplace in East Iceland.
- **Alcoa Australia:** Impacting job satisfaction, recruitment, development and retention of women, additional employees pledged to be Catalysts for Change to promote the development of women, build networks, advocate for change and showcase the successes of women.
- **Alcoa Brazil:** Our operations in Brazil created an Executive Committee on Diversity, which brought governance and diversity initiatives to all sites in 2019. The sites conducted 11 workshops and panels involving approximately 700 employees, presented four videos on gender and LGBT+ inclusion, and distributed 15 internal and external communications that included emails and social media posts.

We are not only working to improve our equity but also our transparency. In 2019, we conducted our first global pay equity analysis for our salaried employees following best practice methodology with third-party analysis. In both measurements, parity is considered when the result is within 3 percentage points. Key findings include:

- We have a 2 percent gender pay gap within specific pay band categories. This means women earn 98 percent of what men make in the same pay bands.

Alcoa Fjarðaál employee

- Our overall gender pay gap is 18 percent, with women earning 82 percent of what men earn when all salaried positions are compared globally. This gap reflects the lower representation of women in the top pay bands.
- The overall gender pay gap is slightly less when looking more narrowly at our job band reporting groups:
  - Executive: 11 percent (favors men)
  - Professional: 14 percent (favors men)
  - Support: -14 percent (favors women)

We are committed to achieving gender balance across Alcoa and are working to address any exceptions and processes that have contributed to our 2 percent gap in specific pay band categories. We are also focused on defining long-term intentional actions to improve overall equity in earnings.

Our annual incentive compensation is linked to our leaders' diversity performance and calculated based on permanent, apprentice and graduate employees. Casual or limited-term workers and employees on long-term leave are excluded.

The 2019 target, which represented 10 percent of the incentive compensation formula, was to increase the percentage of our workforce that is female by 0.8 percentage points. While we fell short of the target by 0.4 percentage points, we did improve by 0.4 percentage points during the year.

Our approach in 2020 will focus on the leading indicators that result in long-term, sustainable diversity advances.

2019 Global Women

Diversity Indicator	Percentage
Females on the Alcoa Corporation Board of Directors	33.3
Female share of total workforce	15.5
Females in all management positions	20.7
Females in junior management positions	16.2
Females in top management positions	43.5
Females in management positions in revenue-generating functions as a % of all such managers	29.8

Our global women calculation is based on all categories of employees, including full and part-time permanent, full and part-time apprentice, and graduate employees.

Our culture shapes the day-to-day environment that our employees experience and also impacts talent and business outcomes. We are evolving our employee survey strategy to ensure we are listening frequently to the voices of our employees in a more structured manner to identify the most important elements that contribute to their experience at Alcoa.

We are moving toward shorter biennial surveys with interim pulse surveys that measure progress on our specific areas of focus. We are also leveraging key standard questions, which enables us to compare our results against global norms.

Our first revised survey will be launched in early 2020 to establish baselines on new areas of focus and measure progress on prior areas of feedback. Quarterly pulse surveys will measure progress on employee and organizational priorities. Our primary goal is to involve employees in action planning and ensure clear accountability for follow-up actions and ongoing communications in response to the feedback received.

Our diversity, inclusion and equity efforts received numerous honors in 2019. We were named to the 2020 Bloomberg Gender-Equality Index, and we received a score of 95 on the Human Rights Campaign Foundation's Corporate Equality Index 2019. Additional recognition can be found in the Awards section of this report.

2019 Employees by Employment Contract and Type

| | Contract | | Type | |
	Permanent	Temporary	Full-time	Part-time
Male	11,667	527	11,666	527
Female	2,136	186	2,023	299
Total	**13,803**	**713**	**13,689**	**826**

Permanent employees include permanent, apprentice and graduate employees. Temporary workers are employed as casual or limited-term workers with a contract of limited duration that often terminates along with a specific event (e.g., end of a project, a permanent employee returning from leave or the completion of a stated period of time).

2019 Employees by Region and Employment Status

	Permanent	Temporary
Asia/Australia	4,049	122
Europe/Middle East/Africa	2,595	589
North America	5,556	2
South America	1,603	0

CASE STUDY

Catalysts for Change

In our mines, refineries and offices throughout Australia, some 300 employee "catalysts" have pledged to promote the development of women, build networks, advocate for change and showcase the successes of women in the workplace.

Launched in 2015 by the Alcoa Women's Network chapters in Australia, the employee-driven Catalysts for Change (C4C) program is enabling a cultural shift toward a more inclusive workplace.

Recent C4C achievements include:
- Unconscious bias training for hiring managers;
- Mentoring of female colleagues by experienced employees who have signed the pledge;
- Appointment of a gender sourcing specialist to support diversity goals

and ensure recruitment practices are inclusive to attract top female talent;
- Revised job prerequisite requirements to reduce the barriers to women applying for traditionally male roles; and
- The creation of the Women in Operations program to retain top talent to take on operational and leadership roles.

These large achievements are supplemented with the actions of individual employees. Chris Phillips, for example, established a job share arrangement for two female engineers.

"I feel empowered to take action—from ensuring that someone gets the flexibility she needs to support her family to challenging the status quo in our human resources policies," said Chris, who is the technical manager at our Kwinana Refinery. "I have definitely seen a shift.

I'm excited to see more women taking on operational roles and challenges that they would not have previously considered. I can see a culture change, too. We have meetings that are filled with different ideas, different energy and different solutions."

	Overall	Voluntary
Male	19.3	9.1
Female	21.4	12.6
Total	**19.6**	**9.6**

Talent Acquisition

We are creating a more agile and productive workforce by attracting the best talent with the skills, values and ideals that align with our culture.

In 2019, we added a talent sourcing specialist to identify and target candidate pools that have high levels of Alcoa prospects. The specialist is building brand awareness and brand expansion via multiple marketing channels with the support of talent acquisition service providers. We also enhanced our social media, online and career fair presence to extend our recruitment reach.

To further enhance our employer branding, we launched our Employee Value Proposition (EVP) project in 2019. We gave all salaried employees the opportunity to provide anonymous feedback on the current perception of Alcoa as an employer, as well as what they would like to see Alcoa become. We are engaging our employees in the development of our new value proposition to better solidify our vision of becoming operator centric.

We use a modern, efficient approach that simplifies and streamlines talent acquisition, allowing our hiring managers, HR personnel, employees and prospective candidates to collaborate quickly and easily.

Our global HR system provides an internal listing of all career opportunities globally. This makes it easier for our employees to apply for positions or refer potential candidates, and it also allows our recruiting team to identify candidates quickly.

At the location level, we seek to hire local candidates when possible. We engage with universities to identify top local talent, and we offer internships and apprenticeships to help develop the local workforce.

We continued to focus on the diversity of our candidate pool in 2019, using a tool that ensures our job postings are gender neutral and without bias. We also use an online portal with real-time labor market insights to support a range of strategic initiatives focused on talent. These include forecasting for the future workforce, finding talent pools and building better recruiter expertise on local talent and skills.

Our acquisition team has engaged in a focused and determined effort to identify diverse talent and ensure that these candidates are given equal opportunity to interview and receive an offer for a role. More work needs to be done to convert higher numbers into Alcoa employees, but the intention is to continue this pipelining through direct sourcing, professional societies, events, outreach activities and targeted marketing.

CASE STUDY

On a Course to Employment

A partnership between our Alumar operations in São Luís, Brazil, and national training organization SENAI is boosting workforce skill levels and creating sustainable employment opportunities for the region's residents.

A survey of local employers identified workforce skills required for their operations. SENAI then developed courses to address the gaps, with residents applying for the free training. Alumar funds the program due to its priority in hiring local workers.

Since 2016, SENAI has conducted professional training for São Luís residents in the construction trades, including bricklaying, painting, carpentry and ironworks. Most courses run for two months, and participants completing the training receive a certificate from SENAI and access to job placement services. Through 2019, SENAI had issued more than 190 certificates.

"I had no qualifications as a painter, so I decided to take the course to improve myself and acquire more knowledge," said Simone Rodrigues. "Upon completion, I got work initially as a painter's assistant since I did not have much experience. Because of the training, I could get a new job and improve the quality of life for my family."

People Development

We believe people development should support our company's strategic priority of reducing complexity.

We continued advancing this vision in 2019 by focusing on how we engage, assess and grow our people through our People Development Program (PDP) and the implementation of our global HR system. The intent of PDP is to develop people by giving them tools to engage in rounded feedback sharing and check-ins with their manager for ongoing development.

Rather than assessing employees on a single rating, we consider each employee's full contribution and unique performance narrative, which consists of tangible examples of an employee's performance against our four contribution factors. All employees and their managers engage in a dialogue around these factors, which are:
- Performance against goals, including individual contributions;
- Demonstration of Alcoa behaviors;
- Impact to the business and team; and
- Use of development for success.

In 2019, we continued to focus on new ways to engage and develop our global workforce, with a key focus on PDP enablement. Globally and locally, we conducted webinars and sent communications to equip employees and managers to share feedback with others in a constructive way. We provided support materials to help employees and managers have more meaningful conversations. We also more strongly linked career check-ins into our integrated talent cycle to ensure employee career aspirations are thoughtfully considered when making talent decisions related to succession planning, moves, and more.

We continued to support several cohort-based programs that focus on building business acumen and leadership skills while ensuring our employees have a chance to connect with others from across the globe. These included:
- A location-based program for our frontline supervisors called Advancing Supervisory Excellence;
- The Technical Leadership Excellence program that focuses on our technical talent embarking on a year-long development journey;
- Our Alcoa Management Essentials program in collaboration with the University of Pittsburgh;
- The Transformational Leadership Development Program for executive development; and

- The Leadership Fundamentals Program in Australia, which provided participants with the opportunity to apply classroom learning to relevant workforce issues.

In service to both culture and leadership development, we launched our Operator Centric program in 2019. This program is aimed at developing our leaders to empower and engage the workforce to solve problems and bring creative solutions through strategic and tactical coaching conversations. This furthers the notion that managers can act as teachers or coaches by passing on their knowledge and expertise. They also can partner with their teams to co-create solutions to operational issues. Members of our Executive Team and leaders from other areas of the business participated in the training in 2019.

All employees and many Alcoa contractors had access to AlcoaLearn, a global online learning management system, in 2019. AlcoaLearn housed more than 9,200 online courses and supported the administration of more than 19,700 instructor-led training sessions for a total of nearly 95,000 recorded training hours during the year. We also supported employee participation in professional certification, leadership development and other external training programs not tracked through our learning management system.

2019 Employee Training	
	Per Full-time Equivalent
Average hours of training and development	43
Average amount spent on training and development	US$1,067

Data are for formal classroom hours and tuition reimbursement.

In June 2019, we launched the learning management system module of our recently deployed people system. This new system, which replaced AlcoaLearn, houses online training content created by the locations, as well as purchased professional and leadership development content. It allows employees to share their knowledge with others through the peer learning functionality, providing them with the ability to create lessons that they can then share with the rest of the organization. The system also enables social networking, allowing others to comment on lessons created by peers or other online content in the system.

Our training programs provide both direct and indirect financial returns. For example, each participant in our Technical Leadership Excellence program was expected to complete an action learning project that provided at least US$50,000 in value to the company. The total impact for the program, which finished in February 2019, was more than US$12 million in cost savings or revenue generation.

Compensation

To attract, retain, motivate and engage our employees, we provide compensation that is competitive within the relevant labor market.

We recognize an employee's full contribution through our total rewards approach, seeking to align a value proposition that results in satisfied, engaged and productive employees who contribute to the overall success of the company and drive results.

Total rewards encompass both financial and non-financial components. Financial components include:

- Performance pay, which is driven by location priorities and typically focused on the achievement of both financial and non-financial targets;
- You Make a Difference Award, which is given to employees who exceed their usual work requirements or show exemplary demonstration of our Values;
- Special quarterly stock awards, which are discretionary awards designed to recognize significant contribution within a short timeframe following the contribution;
- Core long-term incentive program, which is designed to attract and retain leadership talent;
- The Element Award, which provides long-term incentives to high-contributing employees critical to the long-term success of our company; and
- Annual incentive compensation plan, which rewards individual contribution and meaningfully differentiates based on individual contributions.

In recognition of their significant contributions and importance to our-long term future, more than 10 percent of eligible employees benefited from the Element Award and discretionary special quarterly stock and cash awards in 2019.

In 2019, we again linked 30 percent of our annual incentive compensation plan to non-financial metrics that were focused on achieving significant aspects of our sustainability targets. While our diversity results were under the target, the safety payout exceeded the target due to our strong performance that reflected organizational focus and prioritization. A variety of operational issues negatively impacted our carbon dioxide emissions, preventing us from achieving that target.

2019 Sustainability Incentive Compensation Targets

Category	Percent of Annual Incentive Compensation Plan Formula	Weighted Payout *(Percent)*
Safety	15	22.5
Diversity	10	0
Environment *(carbon dioxide reductions)*	5	0

For additional compensation information and data, see the Shared Value Creation section of this report and the Compensation Discussion and Analysis in our 2020 Proxy Statement.

Safety and Health

Our aspiration is to work safely, all of the time, everywhere. We attend to health and safety before any other priorities, putting the protection of human life above all else. Underscoring our commitment is our Care for People Value.

Our work can be hazardous and involves many types of operations. It is imperative that we have a pervasive health and safety culture and strong systems that equip our people with the skills, knowledge, controls and protection they require to avoid injuries and illnesses and, most importantly, fatalities.

Each day, we strive for what we believe is the ambitious yet attainable goal of zero fatalities and zero life-threatening or life-altering injuries and illnesses.

SAFETY

Our systems are designed to prevent loss of life and serious injury at our locations. This is our most fundamental objective.

In 2019, we had our second consecutive year with no employee or contractor workplace fatalities. However, we had three serious injuries that underscored the need for continuous improvement. In addition, a contracted worker died after an accident at our Poços de Caldas facility in Brazil in February 2020.

We document any incident that has the potential to cause either a fatal or serious injury, which is known as a fatal and serious injury potential (FSIP). Our 2019 FSIP rate was 1.38 incidents per 100 full-time workers, which was a 20 percent decrease compared to 2018. Our total fatal and serious injury (FSI) rate, which is FSI actuals and potentials per 100 full-time workers, declined 25 percent in 2019.

While we are not satisfied with a high number of these FSIP events, we view them as a good indicator that our locations are focused on identifying these events, even if no injuries have occurred. We also consider each FSIP a learning opportunity. Our Executive Team and other senior leaders review corrective actions and effectiveness of controls and also sponsor company-wide hazard-mitigation initiatives.

Our OneAlcoa: United for Safety initiative integrates temporary workers, contractors and visitors into our safety programs and data. While we have seen some year-over-year increases in our safety rates as we better identify risks with these groups, all of our rates have remained significantly below the most recent U.S. manufacturing averages.

Data recordkeeping audits, injury classification reviews and other factors have resulted in changes to our safety data from prior reporting. Comprehensive safety data is provided in the Appendix.

Fatalities
Employees/all contractors

	Global	Australia	Europe	North America	South America
2015	**2/1**	0/1	0	2/0	0
2016	**0/1**	0	0	0	0/1
2017	**0/3**	0	0/1	0	0/2
2018	**0**	0	0	0	0
2019	**0**	0	0	0	0

Fatal and Serious Injuries/Illnesses
Employees and all contractors

	FSI Actuals (Events resulting in a fatal or serious injury/illness)	FSI Potentials (Near-miss events)	Total FSI Events	Total FSI Rate
2015	5	698	**703**	**1.82**
2016	5	300	**305**	**1.08**
2017	5	433	**438**	**1.86**
2018	3	427	**430**	**1.84**
2019	3	339	**342**	**1.38**

A serious injury/illness is any incident that is life-threatening or life-altering. FSI rate is FSI actuals and potentials per 100 full-time workers.

Days Away, Restricted and Transfer Rate
Employees and all contractors

	Global	U.S. Manufacturing Average	Australia	Europe	North America	South America
2015	**0.33**	2.2	0.46	0.29	0.39	0.09
2016	**0.29**	2.1	0.49	0.16	0.26	0.21
2017	**0.62**	2.0	0.85	0.63	0.82	0.22
2018	**0.71**	2.0	0.96	0.64	1.03	0.27
2019	**0.86**		1.08	0.83	1.25	0.38

The 2019 Bureau of Labor Statistics U.S. manufacturing industry average was not available at the time this report was published. Days away, restricted and transfer rate includes lost workday cases plus cases that involve days of restricted duty and job transfer per 100 full-time workers.

Lost Workday Rate
Employees and all contractors

	Global	U.S. Manufacturing Average	Australia	Europe	North America	South America
2015	**0.12**	1.0	0.23	0.07	0.13	0.04
2016	**0.15**	0.9	0.31	0.08	0.11	0.11
2017	**0.25**	0.9	0.49	0.12	0.20	0.16
2018	**0.22**	0.9	0.41	0.09	0.24	0.11
2019	**0.22**		0.38	0.27	0.08	0.20

The 2019 Bureau of Labor Statistics U.S. manufacturing industry average was not available at the time this report was published. Lost workday rate represents the number of injuries and illnesses resulting in one or more days away from work per 100 full-time workers.

Total Recordable Incident Rate
Employees and all contractors

	Global	U.S. Manufacturing Average	Australia	Europe	North America	South America
2015	**1.11**	3.8	1.33	0.80	1.61	0.36
2016	**1.10**	3.6	1.43	0.81	1.38	0.46
2017	**1.57**	3.5	1.96	1.36	2.37	0.45
2018	**1.66**	3.4	2.38	1.45	2.41	0.55
2019	**1.81**		2.19	1.50	3.09	0.58

The 2019 Bureau of Labor Statistics U.S. manufacturing industry average was not available at the time this report was published. Total recordable incident rate includes days away, restricted and transfer cases plus cases that involve days of medical treatment or other recordables per 100 full-time workers.

Our safety strategy is aligned to two pillars—systems and culture.

Systems

Safety Standards

After an extensive update of our safety standards in 2018, each location conducted a gap analysis against the new standards in 2019 and developed a three-year action plan to close identified gaps. Actions are being prioritized based on operational risk profiles.

Risk-based Audit

Our periodic risk-based audits at the location level emphasize observing people and processes where the work is performed to accurately assess the risks.

An audit team consisting of internal EHS experts, our operational subject matter experts and external consultants collaborates with location personnel to identify a site's critical risks. Team members then spend up to 80 percent of their time on the shop floor, talking with and observing employees and contractors as they conduct specific tasks related to those risks. The remaining time is spent reviewing checklists, standards, permits and other documentation to ensure compliance.

In 2019, we improved the quality of our audit process by deploying a new training program on professional auditing. Our goal is to have every employee complete the training before participating in an audit, with a core group of 100 trained internal auditors. We trained 80 employees by the end of the year.

To further ensure that our EHS risk-based audit program is relevant and effective, we engaged a third party to assess the program in 2019. While the assessment did not uncover any major gaps or areas of concern, we created an action plan to address improvement suggestions.

Root-cause Analysis

We use a formal and standardized process for investigating FSI actuals and a small subset of FSIPs to ensure root causes are identified, addressed and communicated. Our analysis tool allows us to evaluate, prioritize and address the critical causes and drivers behind an incident, as well as report the findings to all locations using the same methodology.

In 2019, we conducted training in effective root-cause analysis for employees and contractors around the world. More than 170 people completed the two-day class, and we plan to conduct additional training in 2020.

Environment, Health and Safety Management System

Our ISO-certified corporate EHS management system provides a universally recognized management framework for our EHS risk evaluation, planning, objective setting and operational control activities at all locations covering both employees and contractors. In 2019, three of our locations were also certified to the Occupational Health and Safety Management System standard (OHSAS 18001:2007).

Critical Risk Management

Each location is responsible for developing a registry of all safety hazards and either eliminating the hazards or implementing controls to prevent and mitigate the risks associated with the hazards. Our corporate safety group provides global oversight and verification with assistance from our regional vice presidents of operations.

Our six most critical hazard categories that could cause a fatal or serious injury are mobile equipment, crane safety, confined space, fall control, lock/tag/verify and electrical. We also have a critical hazard that is specific to each production process—earth-moving equipment (mining), chemical burns (refining), molten metal (smelting/casting) and machine guarding (rolling).

In 2019, we implemented a new critical risk management system to track field verification to ensure critical controls are in place and managed effectively. This digital technology with GPS functionality allows us to track when and where verifications are conducted and where control failures are located, providing significant data for analysis and action.

The tool is used globally by each location's leadership, employees and some contractors, with each location creating a schedule of how many verifications are required for each critical-risk task. In addition, we require one field verification per week for operations managers, one per day for supervisors and one per shift for group leaders.

Human performance

The majority of our locations are certified in a core operating standard based on human performance, which teaches employees how to anticipate and recognize situations where errors are likely to occur. This tool helps to predict, reduce, manage and prevent fatalities and injuries from occurring. The remaining locations continued working toward certification during 2019.

We are further integrating our critical risk management with human performance in toolbox meetings, which are conducted at the beginning of each shift, and through training for employees and contractors.

As part of human performance, all of our employees and contractors are empowered to stop their work or that of a colleague or contractor if they believe the situation is unsafe or if they are unsure of the potential outcome.

Culture

Each day, we demonstrate that safety comes first—before production, before cost, before everything. We strive for a culture of transparency and agility, where we put the well-being of every employee, temporary worker, contractor and visitor before any departmental or operational consideration; where we show with our actions that safety is more important than other business imperatives; and where we openly and actively share both our good ideas and our setbacks.

Safety Goal

In 2019, we required all salaried employees to include a safety objective in their annual performance objectives, regardless of where they worked or what job they performed. We believe having an individual safety objective empowers our employees to be more involved in creating our safety culture.

Goals were commonly related to critical risk management and human performance. Other employees set safety expectations in various business processes, such as recruitment, employee onboarding and procurement.

Culture Assessment

To gain a better understanding of our current safety culture and identify opportunities to strengthen employee commitment to an FSI-free workplace, we piloted culture assessments at our Willowdale mine in Australia and San Ciprían refinery in Spain during 2019.

Each assessment consisted of a 50-question survey that was completed by employees and contractors from different departments. The focus was on evaluating conditions and generating feedback surrounding current safety practices. Our vice president of EHS led workshops at each location to discuss survey results and generate action plans for areas identified as requiring improvement.

We will roll out the culture assessment to all locations globally following a planning period in 2020.

Safety Leadership Standard

Created in 2018, our safety leadership standard helps managers throughout the company understand their roles and responsibilities in fostering a supportive safety culture. The standard includes requirements for reporting and responding to safety incidents, having leadership present where the work is taking place and forming safety committees.

In 2019, we required each location to conduct a gap analysis against the standard and develop an action plan to close the identified gaps.

Training

All employees, particularly those at an operating location, are required to take annual safety and health training that is determined by their specific roles, tasks, areas where they work, job functions and responsibilities. The location's EHS and human resources personnel determine what training is required for each employee, with more than 100 classroom and online training modules available on procedures, policies and operational processes.

Our global learning management system enables us to assign, distribute and track required EHS training. The system alerts each employee to required training and gives location managers and supervisors visibility into training status on an individual, department and location-wide level.

In 2019, we developed the EHS Leadership Training Program for all operational and frontline leaders. Aligned with our values, the training is designed to enhance and nurture our EHS culture and ensure that our leaders have the tools, competence and confidence they need to effectively manage EHS at their locations. We will pilot the program in early 2020 and begin the global rollout later in the year.

HEALTH

Our health vision is to prevent future occupational disease through our exposure controls; support personal health and well-being through our workplaces and culture; and operate in a manner that does not negatively impact the health of our communities.

A four-pillar health framework, with overlapping and synergistic elements, guides our strategies and tactics toward achieving this vision:

- Health hazard controls to prevent occupational disease;
- Health status and fitness for work to ensure an employee's health status is compatible with assigned work;
- Community and public health, which facilitates our social license to operate; and
- Personal health and well-being.

CASE STUDY

The (Virtual) Reality of Safety

Surrounded by familiar equipment and sounds, employees at our refineries worldwide are learning how to safely and correctly complete high-risk tasks—without the high risk.

A virtual reality (VR) training program simulates a variety of scenarios where an employee must address events and risks associated with a specific task, replicating what could occur in real life. Initial training has focused on isolating electrical switches to avoid arc flash incidents, with training occurring in a virtual Alcoa refinery substation. Additional VR training models are being considered for other high-risk tasks.

"VR training is a great way to remain safe in an environment where my confidence may be lacking," said Jordan Weir, training coordinator at our Pinjarra refinery in Australia. "Knowing that I was being led in

an environment where the consequences were just as real as in the field— but the critical risks were eliminated—allowed me to focus on the task correctly."

According to various research, VR training typically provides a higher learning retention rate compared to traditional computer-based training.

"I've taken both traditional and VR learning, and I much prefer VR learning," said Ben Curtis, who is also a training coordinator at our Pinjarra refinery. "You walk through at your own pace, building on what you just covered and putting the learning into practice. All the while you learn from your mistakes and visually see the effects."

Further guiding our efforts are internal global health standards that often are more stringent than those specified by applicable law. We also proactively identify and respond to emerging health-related trends in our industry, and we have a long-standing relationship with the Health Committee of the International Aluminium Institute.

Health Hazard Controls

The health hazards inherent in our operations may include chemical, physical (noise, ergonomic, radiation, heat and vibration), biological and other types of hazards. Our locations have spent decades implementing processes, procedures, equipment and technologies to mitigate these risks and have made significant progress.

With support and direction from our internal Health Center of Excellence (CoE), our locations continuously strive to further eliminate or reduce hazardous exposures in adherence to the hierarchy of control principles.

Enhanced heat stress management practices for our highest risk locations was a focus in 2019. Actions included a comprehensive review of heat stress exposure data in select smelters, work-rest cycling analyses, amplified medical assessment programs and the piloting of state-of-the-art employee physiological monitoring technology for real-time tracking of heat strain.

Noise remains our most prevalent health hazard. Our recently adopted mandatory global requirement for quantitative fit testing of hearing protection fully matured in 2019, as our first three-year testing cycle ended. We conducted quantitative fit testing of hearing protection on 95 percent of the targeted employees against a goal of 100 percent.

Communication on health hazards is a centerpiece of our health management strategy, which aligns with our company values and compels us to inform our employees and contractors of the hazards and risks that they may encounter in the performance of their daily work.

In 2019, for example, our Health CoE prepared the "Welding & Health Fact Sheet" that consolidated all relevant health hazard information related to this task. We distributed the fact sheet to our location health and medical personnel for further cascading to all welders.

Health Status and Fitness for Work

Our focus within this pillar is on addressing the ability of employees to safely perform their assigned work activities. This is enabled by our occupational medicine services, fatigue and shiftwork practices, substance use and abuse programs, worker's compensation management, rehabilitation and return-to-work approach, and emergency medical response capabilities.

Regardless of a location's size, all employees have access to occupational medicine services. These include:
- Regulatory or Alcoa-driven risk-based chemical surveillance evaluation;
- Fitness-for-duty (inclusive of return-to-work) assessment with associated rehabilitation consultation and job placement support, as appropriate;
- Hearing evaluation;
- Lung-function testing
- Work-related injury and illness evaluation and treatment;
- Substance use and abuse testing; and
- Job-related immunizations.

Revisions to our medical evaluation process that are designed to improve focus and efficiency continued to gain traction across a number of locations throughout 2019. While the deployment has progressed slower than expected, the practices essentially have been fully implemented at our Western Australia locations. We have initiated pilots in Brazil and the U.S.

Community and Public Health

Our community and public health initiatives require us to be attuned to the interests and needs of the communities in which we operate against the backdrop of local or national regulatory obligations.

We are mindful of the relevance of potential environmental emissions on the communities in which we operate and strive to reduce any such impacts to the lowest possible level.

We continuously monitor the occurrence of disease outbreaks and emerging infectious diseases in proximity to our operating locations to offer support and guidance in risk avoidance to our local medical and health professionals, as well as expatriates and business travelers.

Other focus areas within this pillar include product stewardship, the European Union's REACH regulation, our safety data sheet authorship and management system, and

response to customer and consumer concerns related to our products and public health. Our locations also invest in programs and initiatives aimed at improving individual health and wellness in the communities in which they operate.

Personal Health and Well-being

Programs focused on personal health and well-being among our employees originate at the location level. These grassroot efforts can include biometric screenings, nutrition programs, wellness competitions and more. In the U.S., a wellness program coordinated via our third-party administrator also motivates our employees toward improved personal health.

The well-being of our employees is enhanced by many of our existing health initiatives. Examples include location-based employee assistance programs, traveler and expatriate health, safety and security, return-to-work programs and our newly crafted global fatigue risk management standard. The latter includes training requirements, such as sleep hygiene strategies that impact personal health.

Mental health will be a focus area in 2020. Among our planned activities is participation in World Mental Health Day, which is sponsored each October by the World Health Organization.

CASE STUDY

A Life Saved

When Doug Buist walked into the onsite medical facility at our Wagerup refinery in Western Australia for his company medical evaluation, he was confident of a good

outcome due to his active lifestyle, healthy diet and adherence to Alcoa's health protection practices. He left with a referral to a cardiologist—an unexpected turn of events that ultimately would save his life.

"I was required to have an annual physical because of my work activities and also since I was a member of the location's fire brigade," said Doug. "The site doctor put a stethoscope on my chest, my back and then my chest again. He said he didn't like the sound of my heart and wanted me to see a specialist."

The cardiologist diagnosed a leaky heart valve but recommended monitoring over surgery. A year later, the news was not as

good. The valve had degraded rapidly and now needed to be repaired surgically. The operation was a success, but Doug was unable to return to work due to secondary surgical complications. He continues to maintain a healthy diet, take hour-long bicycle rides and cultivate his small orchard with modified techniques and the help of friends and family.

"Throughout my recovery, I had a lot of support from my coworkers, with a bunch coming to harvest the fruit from my orchard since I couldn't do it," he said. "The medical staff also kept in close touch with me. I was very lucky the site doctor discovered the issue. Even the surgeon said he saved my life."

Supply Chain

Our sustainability approach covers the entire life cycle of a product, making it critically important for our suppliers and those who serve them to conduct business in a responsible, ethical and sustainable manner.

Global Supplier Sustainability Program

In 2019, we implemented a new Global Supplier Sustainability Program that gives greater insight into the sustainability performance of our suppliers and improves the management of our supply chain risk.

Under the enhanced program conducted in partnership with EcoVadis, we assess select suppliers against 21 criteria in the categories of environment, labor and human rights, ethics and sustainable procurement.

Each participating supplier completes a comprehensive questionnaire that is tailored to its industry, sector, size and country. EcoVadis audits the information and scores the supplier's overall performance as well as performance against the four categories and 21 criteria on a scale of one to 100. The supplier can share its results with Alcoa and other customers.

Advanced analytics allow us to compare each supplier's scores against our supply base, our industry, all suppliers in the EcoVadis network and more. We also can benchmark aggregate scores against industry peers and others. This in-depth visibility into our supply base allows us to quickly identify and manage risks and seek improvement in supplier performance.

Suppliers not meeting our minimum requirements must create a corrective action plan using

Supplier Assessment Criteria

ENVIRONMENT
- Energy consumption and greenhouse gases
- Water
- Biodiversity
- Local and accidental pollution
- Materials, chemicals and waste
- Product use
- Product end of life
- Customer health and safety
- Environmental services and advocacy

LABOR AND HUMAN RIGHTS
- Employee health and safety
- Working conditions
- Social dialogue
- Career management and training
- Child labor, forced labor and human trafficking
- Diversity, discrimination and harassment
- External stakeholder human rights

ETHICS
- Corruption
- Anticompetitive practices
- Responsible information management

SUSTAINABLE PROCUREMENT
- Supplier environmental practices
- Supplier social practices

guidance provided in the actionable scorecard, focusing first on high-priority items. We track progress against the plan to ensure performance improves over time. We also encourage suppliers that meet our minimum requirements to develop a corrective action plan so they start to close gaps and demonstrate continuous improvement in sustainability.

In 2019, more than 300 corporate groups covering nearly 600 suppliers (7 percent of our global supply base) participated in the program in three groups based on our procurement spend with them:

- First: Higher than US$5 million.
- Second: More than US$100,000 for high-risk commodities.
- Third: Above US$1 million.

Of the suppliers completing the assessment in 2019, 96 percent met our minimum requirements. The average overall score was 45.6, which is 7.5 percent above the EcoVadis benchmark.
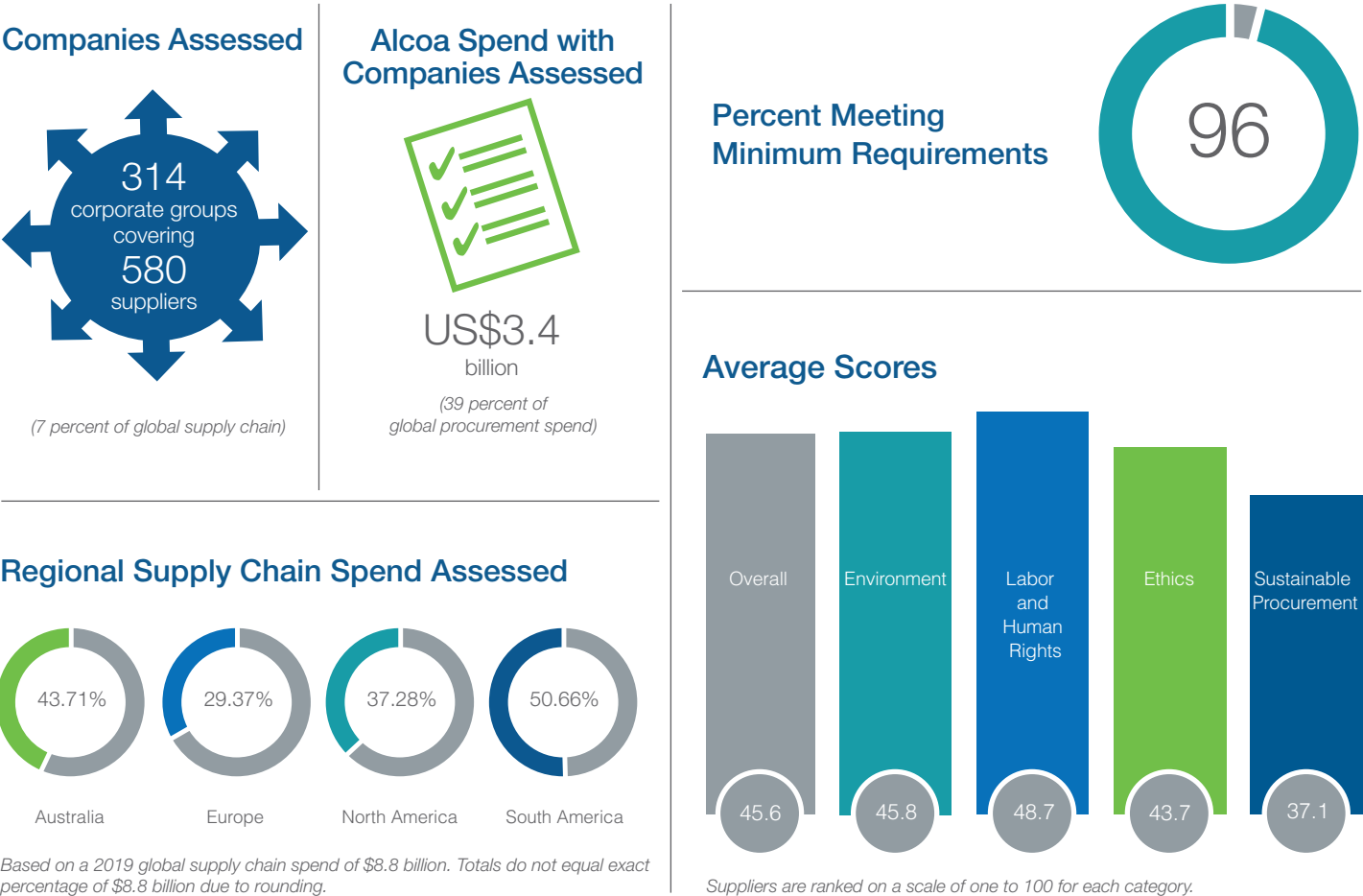
"Alumar has been one of the companies that maintained the Suppliers Development Program of Maranhão (PDF) since the beginning. Over 20 years of support and encouragement, Alumar has contributed to the creation and growth of companies and income in Maranhão. Alumar, in partnership with PDF, presented the AlcoaBuy tool to local companies in 2019. This tool expands the opportunities for supplying the company with materials and services, enabling the generation of more business."

Carlos Jorge Taborda Macedo
Supplier Development Program Coordinator
Federation of Industries of the State of Maranhão

We use a separate third-party supplier due-diligence program to further manage risk in our supply chain related to the areas of anti-bribery and corruption, trade

2019 Global Supplier Sustainability Program Results

Companies Assessed

314
corporate groups
covering
580
suppliers

(7 percent of global supply chain)

Alcoa Spend with Companies Assessed

US$3.4
billion

(39 percent of global procurement spend)

Percent Meeting Minimum Requirements

96

Average Scores

Overall	Environment	Labor and Human Rights	Ethics	Sustainable Procurement
45.6	45.8	48.7	43.7	37.1

Suppliers are ranked on a scale of one to 100 for each category.

Regional Supply Chain Spend Assessed

Australia	Europe	North America	South America
43.71%	29.37%	37.28%	50.66%

Based on a 2019 global supply chain spend of $8.8 billion. Totals do not equal exact percentage of $8.8 billion due to rounding.

compliance, child and slave labor, criminal history, human trafficking and conflict minerals. This existing program involves suppliers with an Alcoa spend higher than US$50,000 per year that are based in a high-risk country and those with an Alcoa spend above US$1 million per year but are not based in a high-risk country.

Our involvement in the Aluminum Stewardship Initiative helps further embed sustainability into our supply chain.

In 2019, we were awarded Gold supplier classification from EcoVadis. Gold status indicates that Alcoa is among the top 5 percent of companies in our industry and a leader in the sustainability categories of environment, labor practices, fair business practices and sustainable procurement.

Supply Chain Spend

In 2019, we purchased US$8.8 billion in goods and services from thousands of suppliers around the world.

2019 Spend by Region

Region	Procurement Spend *(Billions of U.S. dollars)*	Supply Base Composition *(Percent of total supply base)*
Australia	1.81	20
Europe	2.10	24
North America	3.65	42
South America	1.28	14
Total	**8.84**	**100**

To help increase our spend with suppliers near our facilities, we use a procurement tool that allows us to track local spend not only by amount but also by the proximity of suppliers to the Alcoa shipping address. The latter data is categorized by number of shipments to the same city, same state (U.S. only), same country and non-local (outside of the country in which the Alcoa facility is located).

This localized data allows us to identify opportunities to increase our spend with local suppliers and also helps us analyze the environmental impact of transporting products from suppliers to our facilities.

2019 Shipments

| 79.7% Same Country | 11.4% Same State | 7.7% Same City | 1.3% Non-local |
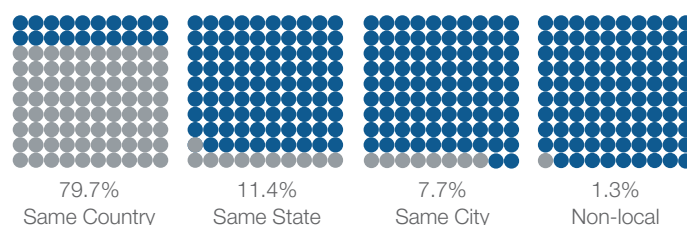
2019 Spend

Supplier Location	Percent	Percent Change from 2018
Same Country	50.0	+7.9
Same State	7.8	+19.3
Same City	4.6	+60.4
Non-local	37.6	-15.5

CASE STUDY

Supporting Local Suppliers

A small company located in São Luís, Brazil, AMA Armazém de Materiais e Abastecimento Ltda. is always looking for innovative ways to stay ahead of the competition. When the Alcoa Buy online marketplace launched, this distributor of kitchen supplies was quickly onboard.

"Alcoa has been a customer for a long time, and Alcoa Buy is a modern tool that simplifies the buying and selling process," said Auriane Passos, business manager for AMA Armazém de Materiais e Abastecimento

Ltda. "It eliminates bureaucracy, freeing up time and resources so we can grow and compete in the market."

Our Brazilian locations use Alcoa Buy to purchase maintenance, repair and operations (MRO) non-inventory products from local suppliers.

"We feel privileged to be a supplier to Alcoa, which stands out as one of the most respected companies in the world for its mission, vision, values and sustainability," said Ms. Passos.

In the Brazilian state of Maranhão, where our Alumar refinery is located, we are a member of the Federation of Industries of the State of Maranhão (FIEMA). As part of its economic development activities, the organization facilitates member access to local suppliers and works to develop the local supplier base.

To further increase our spend with local suppliers in Brazil, we launched an online marketplace called Alcoa Buy for maintenance, repair and operations (MRO) non-inventory products in 2018. After attending workshops, conferences and individual meetings, local suppliers were invited to upload their product catalogs into the marketplace used by our Brazilian locations.

Our Juruti mine and Alumar refinery made 63 percent of their non-inventoried goods purchases through Alcoa Buy in 2019.

Related Information

Supplier Standards
Ethics and Compliance
Human Rights Policy

Improving Our Footprint

Climate Protection

9 INDUSTRY, INNOVATION AND INFRASTRUCTURE

12 RESPONSIBLE CONSUMPTION AND PRODUCTION

13 CLIMATE ACTION

6 ENVIRONMENTAL PERFORMANCE

We have a strong history of leadership in reducing greenhouse gases in the aluminum industry.

Carbon dioxide represents most of our GHG emissions, with our smelters and refineries being the largest emitters. In 2019, our long-term goal was to reduce the intensity of our GHG footprint (direct and indirect emissions) from our smelting operations by 15 percent by 2025 and 20 percent by 2030 from a 2015 baseline. We achieved a 1.3 percent reduction from the baseline through 2019.

Our new goal, which will be implemented in 2020, is to align our GHG (direct + indirect) emission intensity reduction target with the below 2° C decarbonization path by reducing GHG emission intensity by 30 percent by 2025 and 50 percent by 2030 from a 2015 baseline.

Our total 2019 carbon dioxide equivalent (CO_{2e}) emissions equaled 24.3 million metric tons, of which 17.7 million metric tons were direct emissions. This represents a 0.4 percent increase in total emissions and a 5.5 percent increase in intensity compared to 2018. The increase was primarily driven by continued instabilities at our Warrick and Intalco smelters, the restart of our Becancour smelter in Canada, and instabilities at our Portland smelter in Australia that were related to power outages.

Our Scope 3 (supply chain) emissions in 2019 were 39.6 million metric tons of CO_{2e} for seven categories—purchased goods and services; fuels and energy-related activities; transportation and distribution (upstream); waste generated in operations; business travel; product transportation and distribution (downstream); and processing of intermediate products sold to customers. More than 86 percent of our Scope 3 emissions come from the last category and correspond to the transformation of alumina into aluminum by our customers.

We engaged DNV GL to provide limited third-party assurance on our 2019 carbon emissions data. The company's limited assurance report is available in the Appendix.

Carbon Dioxide Equivalent Emissions Intensity
Metric tons of CO_{2e} per metric ton of production (IPCC, 5th AR)

	Refining	Smelting	Total
2015	0.54	6.06	**7.09**
2016	0.53	5.07	**6.08**
2017	0.53	4.20	**5.21**
2018	0.52	5.60	**6.60**
2019	0.52	5.98	**6.96**

Data are for Scope 1 and Scope 2 emissions. The total represents the combined impact of refining and smelting operations indexed to metric tons of primary aluminum production (refining is included at a ratio of 1.9 metric tons of alumina to 1.0 metric tons of smelted aluminum). These two processes and their associated power supply represent 85 percent of our total GHG emissions. Calculations of these emission intensities conform to the IAI Aluminium Sector Greenhouse Gas Protocol using 100-year global warming potentials provided by the Intergovernmental Panel on Climate Change (IPCC). Data changes from prior reporting are due to the removal of data from the La Coruña and Avilés smelters, which we divested in 2019, as well as our adoption of the latest global warming potentials from the fifth assessment report (AR).

Carbon Dioxide Equivalent Emissions
Million metric tons of CO_{2e}

	Direct (Scope 1)	Indirect (Scope 2)	Total
2015	22.4	8.2	**30.6**
2016	17.1	7.3	**24.4**
2017	16.2	5.8	**22.0**
2018	17.5	6.7	**24.2**
2019	17.7	6.6	**24.3**

Of our 24.3 million metric tons of CO_{2e} emissions in 2019, 23.0 million metric tons were associated with carbon dioxide, 1.19 million metric tons were associated with perfluorocarbon (CF4 & C2F6), 54,300 metric tons were associated with methane, 33,400 metric tons were associated with nitrous oxide and 1,400 metric tons were associated with sulfur hexafluoride (SF6). There were no significant hydrofluorocarbon emissions. We had 7,600 metric tons of biogenic CO_{2e} emissions from the combustion of biodiesel. These emissions are not included in the total 2019 CO_{2e} emissions. Of our 2019 direct GHG emissions, 20 percent were covered under an emissions-limiting regulation or program. Data changes from prior reporting are due to the removal of data from the La Coruña and Avilés smelters, which we divested in 2019, as well as our adoption of the latest global warming potentials from the fifth assessment report (AR).

Climate-related Risks and Opportunities

In 2019, we conducted the first analysis of our operations following the recommendations from the Task Force on Climate-related Financial Disclosures. With the help of an external consultant, we assessed our climate-related transition and physical risks and opportunities to identify paths to improve our processes for addressing such risks and leveraging the opportunities.

Key findings included:
- Policy risk exposure is higher in Australia and the U.S. given the concentration of our operations in those two countries. This could be relevant depending on the scenario (future low or high carbon cost).
- Market risk exposure measures the changes in revenue mix and sources as a result of climate risk. We are significantly exposed to the construction and automotive markets, and both are expected to be impacted by high carbon prices.
- Our reputational risk exposure is low because of the strong reductions in GHG emissions that we achieved in recent years, the public commitments we have made to continue reducing our emissions and our alignment with the transition pathway.
- Technology risk exposure is the risk of substituting existing products and services with lower-emissions options. This has been assessed as a moderate risk for our company because aluminum is considered part of the solution for the decarbonization of society (e.g., aluminum enables lower emissions in transportation due to light weight) even if it is an energy-intense industry.
- Physical risk exposure relates to the risk of increased severity of extreme weather events like cyclones and floods, changes in precipitation patterns, and rising mean temperatures and sea levels. We were deemed to have a low level of physical risk exposure across our global portfolio. Some specific sites are exposed to water stress, wildfire and hurricane risk under different scenarios.

Climate Strategy

Our climate strategy in 2019 encompassed five pillars that reflected our challenges and opportunities. Our strategy and performance again led to Alcoa being named to the Dow Jones Sustainability Index during the year.

To better focus our efforts and prioritize our actions, our Executive Team commissioned a Climate Strategy Team in 2018. This cross-functional team of high-level employees reviewed our climate strategy during 2019 and introduced changes to address our current challenges and opportunities.

Carbon Accounting

We maintain an auditable inventory of carbon emissions to monitor progress against targets and report transparently to our different stakeholders. We have developed carbon footprint calculations for most of our products to support the commercial opportunities for differentiation of low-carbon aluminum in the market and to help our customers reduce the carbon footprint of their own products.

Optimization of Energy Consumption and Carbon Credits Trading

The quantity of our GHG emissions is directly related to the type and amount of energy that we consume. We are working to increase our use of low-impact energy sources by incorporating carbon exposure costs in our economic models and also by improving the energy efficiency of our operations. A full discussion of our energy strategy can be found in the Energy section.

Countries around the world are moving at different speeds toward strengthening regulations for carbon emissions. Our experience with the carbon markets in Europe and Canada will inform our approach to future pricing mechanisms used to reduce carbon emissions.

We anticipate that Phase 4 of the European Union's Emission Trading Scheme, which covers the period 2021 to 2030, will have a direct impact on both our carbon and energy pricing. In the United States, the rollback of the Clean Power Plan will delay the potential impact for our coal-fired Warrick power plant in Indiana. In addition, legislative changes under consideration in the state of Washington and the passage of the Climate Leadership and Community Protection Act in New York in 2019 may have future impacts on our smelters in those states.

In March 2019, Australia updated the Safeguard Mechanism to move facilities onto emission-intensive baselines, encouraging energy efficiency and allowing efficient facilities to grow. We have been a long-time advocate of these changes and have been working with the federal government on the sections relevant to our industry.

Carbon Reduction in Operations and Technology Development

Through programs aimed at reducing specific GHG emissions, we made significant progress in reducing our carbon footprint. Curtailment or closure of facilities, some of which were among our highest emitters, also contributed to our emissions reductions.

To ensure our salaried managers and leaders remain engaged in this issue, we connected 5 percent of our 2019 annual incentive compensation to carbon dioxide emission reductions through process upgrades and improved energy efficiency. Due to a variety of plant instability issues, we achieved zero percent.

We continually evaluate the technological limits within our current operations, including our oldest smelters. With this information, we can evaluate new or existing technology-based solutions to help achieve our GHG reduction goals and also take us to the next level of reductions. The latest example of our efforts is the revolutionary ELYSIS™ joint venture technology that eliminates all direct GHG emissions from the traditional smelting process. The process, which emits pure oxygen, is currently being ramped up to

industrial-sized scale through additional development work, with a goal of offering commercial licenses in 2024.

Through the International Aluminium Institute and Alcoa Foundation, we partnered with the World Resources Institute to better understand the barriers associated with setting and attaining science-based targets in the aluminum sector.

Products

We are developing greener products to help our customers deliver more sustainable products to society and also realize

CASE STUDY

Building Climate Resiliency in the Amazon

In Juruti, Brazil, an innovative agroforestry program supported by Alcoa Foundation is building resilience to climate change while providing additional income sources to the region's citizens, especially women.

Photo credit: Asteroide

Marliane das Chagas Soares

It is increasingly challenging for many of Juruti's smallholder farmers and rural producers to grow food due to soil degradation, which has resulted from slash and burn agriculture. Combined with a tendency to plant only a few types of crops, the region is facing increased vulnerability in food security and to the impacts of climate change. In addition, women often have been excluded from key decisions that affect the allocation and use of natural resources.

The Climate Smart Agroforestry Program administered by WRI Brasil is providing farmers and producers with training and on-the-ground assistance on agroforestry practices that build resilience to climate change. These include introducing native

trees and crops, such as the Tonka bean and Brazil nut, that contribute to food security, enhance environmental sustainability and diversity, and generate income.

At the end of 2019, there was a combined 10 hectares (25 acres) of agroforestry systems planted in seven Juruti communities. Women owned 14 of the 22 sites.

"I learned so many things, but the most relevant one was to produce without degrading the soil," said Marliane das Chagas Soares. "My family and I were willing to do something different, and the project was the perfect match. Despite the difficulties, there is an opportunity to dream and to work. Seeing the results of our efforts is very satisfying."

the value of the carbon-free energy in our value chain. An example is our SUSTANA line of aluminum products, which we produce with low carbon emissions or recycled content. (See the Products section.)

We are also active in the development of standards that incorporate carbon measures into the value of products. The Corporate Average Fuel Economy (CAFE) standards in the United States, for example, are encouraging automakers to use lightweight materials, such as aluminum, to meet more stringent fuel-efficiency requirements.

Advocacy

Through industry associations and direct contact, we engage with global stakeholders on the issue of GHGs to ensure fair and effective policies and regulations. These stakeholders include elected officials, government agencies and NGOs.

As an active member of the Standards Setting committee of the Aluminum Stewardship Initiative, we helped develop industry standards that include GHG emissions. We are also working through organizations like the Aluminium Association of Canada, Australian Aluminium Council,

European Aluminium, International Aluminium Institute and The Aluminum Association to inform the industry's approach to, and engagement on, carbon regulation.

During 2019, we continued to engage with government representatives, legislators, NGOs and other stakeholders in the U.S. states of New York and Washington on carbon legislation. We interacted with stakeholders in the European Union (EU) on the revision of the Emission Trading System Directive, Clean Energy for All Europeans package and A Clean Planet for All 2050 vision. We continued discussions with the Quebec government regarding its cap and trade program for 2024 to 2030, and we engaged with the government in Australia on the impacts of climate policy and regulations.

Alcoa Foundation is engaging with governmental organizations and NGOs to advocate the prevention of, and resilience to, climate change. In Brazil, for example, Alcoa Foundation is funding a project that is developing climate-resilient agroforestry systems in rural Juruti. (See the case study.)

CASE STUDY

Greener Transportation

Despite the significant challenges in using intermodal transportation in Europe, our locations in the region increased their use of this energy-efficient method sixfold in 2019. The effort eliminated 1,500 metric tons of transportation-related greenhouse gas emissions.

Intermodal involves transporting truck trailers by railcars or ships as far as possible, with the trailers then loaded onto a truck for the final distance. Transporting product by rail and ships is more energy-efficient than trucking, which translates into reduced GHG emissions.

While intermodal has been used for decades in the U.S., varying country regulations and infrastructure have kept it from gaining popularity in Europe. The width of the rail tracks, for example, can vary from one country to another. There is also a shortage of suitable trains.

In 2018, our European operations used intermodal transportation for 3 percent of all truckloads. That increased to 19 percent in 2019 due to a focused effort by our transportation team to source qualified intermodal shipping partners.

Photo credit: LKW Walter

Intermodal transportation

Energy

Energy is a critical resource for Alcoa due to the energy-intensive nature of our refining and smelting processes.

Securing low-cost and competitively priced energy that has minimal environmental impact is a focal point of our energy strategy. We also work to reduce the amount of energy we consume through operational efficiency and technological advances, which lower our energy costs and GHG emissions.

Energy Intensity
Gigajoules per metric ton of aluminum produced

Year	Value
2015	74.1
2016	73.4
2017	73.6
2018	73.9
2019	74.1
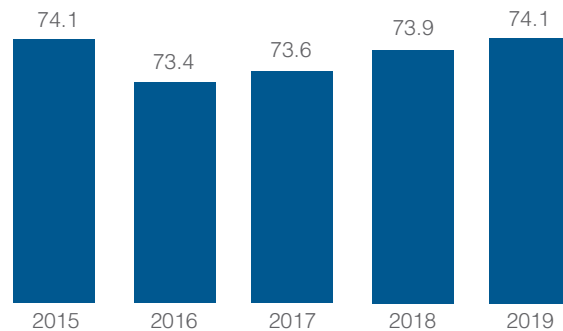
Energy intensity values reflect the net energy value after energy is sold to the grid. Refining is included at a ratio of 1.9 metric tons of alumina produced to 1.0 metric tons of smelted aluminum. The intensity data represents the amount of energy we use onsite in the form of fuels or purchased electricity to produce alumina and aluminum. Data changes from prior reporting are due to the removal of data from the La Coruña and Avilés smelters, which we divested in 2019.

Our energy intensity increased by 0.2 percent in 2019 compared to the prior year. Our overall energy consumption increased by 2.4 million gigajoules, or 0.7 percent, in the same period. Key factors behind the increases are the restart of the Becancour smelter and process instability at two locations.

For energy consumption, we use the Greenhouse Gas Protocol developed by the World Resources Institute and World Business Council for Sustainable Development to establish boundaries for our calculations and account for mergers, acquisitions, divestitures, startups, curtailments and closures of operating facilities. We report energy consumption based on management control and the location-based method as defined in the Greenhouse Gas Protocol. The Intergovernmental Panel on Climate Change Guidelines and country-specific databases, such as the U.S. Environmental Protection Agency's Emissions & Generation Resource Integrated Database, continue to serve as our source of data on the characteristics of electric power generation and heat content values for fuel sources.

DNV GL provided limited assurance of our 2019 energy consumption data. (View the limited assurance report.)

2019 Energy by Source

Source	Direct		Purchased Electricity	
	Thousands of Gigajoules	Percent	Thousands of Megawatt Hours	Percent
Natural Gas	106,356	58.0	4,719	11.9
Hydro	0	0.0	22,768	57.5
Coal	61,392	33.5	7,271	18.4
Oil	11,746	6.4	13	0.0
Other Renewables	107	0.1	3,001	7.6
Diesel	3,500	1.9	892	2.3
Nuclear	0	0.0	951	2.4
Propane	96	< 0.1	0	0.0
Distillates	61	0.0	0	0.0
Local Grid	0	0.0	3	0.0
Total	**183,258**	**100**	**39,618**	**100**

Other renewables include geothermal, biomass, solar and wind energy.

Energy Security

Our energy team is responsible for purchasing approximately 380 terajoules of natural gas per day and supplementing our self-generated power with approximately 3.6 gigawatts of purchased electricity. We secure approximately 40 percent of our natural gas and 60 percent of our electricity under arrangements that exceed 10 years.

Smelters are our largest consumers of electricity, and renewable sources comprised approximately 73 percent of their power consumption in 2019.

Our Canadian smelters (Bécancour, Deschambault and Baie-Comeau) are supplied almost entirely with hydroelectricity. This same renewable energy source accounts for 100 percent of purchased energy consumed by our Alcoa Fjarðaál smelter in Iceland and Massena smelter in the United States, which are both physically connected to the hydro facilities that directly supply these locations. Our Mosjøen and Lista smelters in Norway, both of which are certified to the ISO 50001 energy management standard, use 100 percent renewable electricity that is generated from hydro and wind resources.

Alcoa Fjarðaál smelter

Our portfolio of energy assets is composed of equity interests in consortia and wholly-owned facilities. Our share of the generation capacity of these assets is 1.5 gigawatts, of which 55.3 percent is low-cost hydroelectric power capacity.

Operational Efficiency

We use a variety of approaches to improve operational energy efficiency, including:

- **Benchmarking:** We identify opportunities to compare our operations against industry leaders.
- **University collaborations:** We access the expertise at various universities around the world to develop solutions to our energy challenges.
- **Best practice sharing:** Through our internal Centers of Excellence, we share best practices and transfer operational improvements through numerous channels, including a network of Alcoa experts who provide direction and training to plant technical staff and operators.
- **Location-specific targets:** We set and monitor energy-efficiency targets for each location and develop an implementation roadmap, accounting for process variations from facility to facility.

Our refining operations have implemented significant process improvements over the past few years that focused primarily on process controls, heat transfer efficiency and maintenance improvements.

All of our smelters have realized efficiency improvements with the use of the SMART manufacturing platform, which displays process information so our employees can take action to conserve energy. We are also focused on identifying raw materials or design changes for our smelters that could lead to either more conductive or more efficient management of a smelting pot's heat balance.

We are implementing new technologies in our casthouses that drive energy efficiency, such as oxy-fuel burners that use pure oxygen in a furnace's combustion process to avoid the unnecessary heating of nitrogen contained in air. We have installed magnetic stirring technologies at two of our casthouses to more efficiently mix molten metals, and we have implemented program and hardware changes on our furnace control systems to better regulate pressure and temperature.

Technological Advances

Our heritage in developing new technologies for the aluminum industry dates back to inventing the commercial aluminum industry in 1888.

In the decades since, our experts have created low-energy smelting cells and improved electrical connections. Our advanced process simulation capabilities create real-world technological advances in alumina refining.

We are also investing in the long-term for potential step-change outcomes. For alumina refining, our experts are examining the use of solar energy to power the calcination process and solar gas reforming (using solar energy to increase a gas stream's energy). In aluminum smelting, we continue to invest in research and development to improve energy efficiency and reduce carbon dioxide emissions.

Demand Response Initiatives

Unlike other energy sources, such as oil or gas, electricity cannot be stored economically. The electricity produced (generation) must be balanced with the electricity consumed (load) on a real-time basis to preserve the stability of the electrical grid and prevent blackouts and other system disruptions. The challenge for utilities is that the normal peaks and valleys of demand vary throughout each day, by season and by region.

Demand response is a practice where certain customers, usually larger ones, adjust their electrical load in response to a signal from a utility or the electric grid. This adjustment helps maintain stability in the electrical system by balancing generation and load. The customer is paid for this service.

Our U.S. smelters participate in demand response, providing some or all of the following services:

- **Capacity:** A portion of a customer's load is considered system capacity, allowing the utility to avoid the cost of building additional generation to meet its reserve capacity requirements.
- **Emergency demand response:** A customer will respond within minutes to reduce large blocks of load for short periods of time to balance spikes in demand from other parts of the electric grid. The overall system remains in balance as a result.

- **Spinning reserves:** This service is similar to emergency demand response but on a smaller scale and for a shorter length of time.
- **Load imbalance:** For grids that use solar or wind power, which are intermittent sources of energy, a customer's load is used to keep the grid in balance.
- **Regulation response:** A small percentage of a customer's load is controlled directly by the utility, allowing for real-time adjustments to assist with managing the grid.

In Australia, we have an electricity demand management program for our smelter and refineries. We reduce our demand for electricity at these facilities during the hottest days of the year, which generally coincide with the highest demand for electricity. This helps support efficient investment in electricity infrastructure and avoids additional costs of electricity generation to cover events that only occur a few times a year.

Our production facilities in Spain and Norway provide load interruptibility to their respective transmission system operator to help manage the risk of system electrical blackouts. The facilities are remunerated for providing these services.

In Canada, we provide interruption rights to our power supplier under our long-term supply contracts.

Biodiversity and Mine Rehabilitation

We operate in a manner that aims to minimize our environmental impacts and promote sustainable land use. We are also working toward the goal of no net loss of biodiversity for new sites and major expansion projects.

BIODIVERSITY

We endorse biodiversity conservation, and we consider the mitigation hierarchy of avoidance, minimization, restoration and offsets during the lifecycle stages of our operations.

We respect legally designated protected areas, such as national parks and nature reserves, where strict nature conservation is the management objective. We also have committed to not explore, mine or operate in World Heritage sites.

Prior to commencing new construction projects or significantly expanding existing facilities, we conduct an environmental assessment to identify any potential impacts to biodiversity. This assessment uses techniques, procedures and information generally accepted by the international scientific community as leading practices.

We believe that our operations and biodiversity conservation can coexist on the same land, as we have successfully operated bauxite mines, alumina refineries and aluminum smelters within areas of high biodiversity value. When areas are disturbed by bauxite mining, we progressively rehabilitate the land to mitigate impacts and return it to either a native state or other sustainable use. When feasible, this includes efforts to reestablish to pre-operating conditions.

In 2019, we adopted a new corporate standard for biodiversity management that formalizes our long-standing commitment to biodiversity conservation. The standard requires each site to conduct an assessment and identification of material risks to biodiversity and to manage any identified risks through the implementation of a biodiversity action plan. For new sites and major expansions of existing sites, the standard sets an ambition of achieving no net loss of biodiversity.

Sites Within or Adjacent to Protected Areas or Areas of High Biodiversity Value

Operational Site	Site Location & Size	Position	Biodiversity Value
Huntly and Willowdale bauxite mines	Jarrah Forest, Western Australia 712,900 hectares (1,761,614 acres)	Adjacent to protected areas; within an area of high biodiversity value	Recognized by Conservation International as an international biodiversity hotspot; threatened species and ecological communities (International Union for Conservation of Nature and federal government listed)
Anglesea power station and related coal mine (closed in August 2015)	Anglesea, Victoria, Australia 787 hectares (1,945 acres)	Within and adjacent to a protected area	Protected area; threatened species and ecological communities (International Union for Conservation of Nature and federal government listed)
Wagerup alumina refinery	Wagerup, Western Australia 6,000 hectares (14,826 acres)	Adjacent to areas of high biodiversity value	Ramsar listed wetlands adjacent; threatened species and ecological communities (International Union for Conservation of Nature and federal government listed)

Sites Within or Adjacent to Protected Areas or Areas of High Biodiversity Value

Operational Site	Site Location & Size	Position	Biodiversity Value
Portland Aluminium smelter	Portland, Victoria, Australia 500 hectares (1,236 acres)	Adjacent to a protected area	Threatened species and ecological communities (International Union for Conservation of Nature and federal government listed)
Juruti bauxite mine and related railroad and port facility	Juruti, Pará, Brazil 29,426 hectares (72,713 acres)	Within an area of high biodiversity value	Amazon rainforest and river; threatened species and ecological communities (International Union for Conservation of Nature listed)
Poços de Caldas operations (bauxite mine, alumina refinery and aluminum smelter—the smelter closed in June 2015)	Poços de Caldas, Minas Gerais, Brazil 2,327 hectares (5,750 acres)	Within an area of biodiversity value	Fragmented native forests; threatened species (International Union for Conservation of Nature listed)
Coermotibo bauxite mine operations (ceased operation in October 2015)	Marowijne District, Suriname 32,800 hectares (81,051 acres)	Adjacent to and within a protected area	Adjacent to and within International Union for Conservation of Nature protected area; threatened species (International Union for Conservation of Nature listed)
Point Comfort alumina refinery (fully curtailed in 2016; closure announced in 2019.)	Point Comfort, Texas, USA 1,417 hectares (3,501 acres)	Adjacent to an area of biodiversity value	Native grassland and intertidal emergent marsh (protected under the Clean Water Act); important breeding habitat for wading birds.

Biodiversity Action Plans

We have developed and implemented biodiversity action plans at the following locations:

- Huntly and Willowdale bauxite mines in Western Australia;
- Juruti bauxite mine in Brazil;
- Alumar refinery in Brazil,
- San Ciprían refinery in Spain;
- Kwinana, Pinjarra and Wagerup refineries in Western Australia;
- Portland Aluminium smelter in Australia; and
- Baie-Comeau smelter in Canada.

At each of these sites, the biodiversity action plan:

- Identifies the biodiversity within the area of direct management control or significant influence, including the presence of listed threatened species and communities, in context with surrounding land;
- Assesses potential impacts, both positive and negative;
- Develops a range of strategies aimed at minimizing or mitigating biodiversity impacts;
- Informs our employees and communities in which we operate about the importance of biodiversity protection, and encourages their participation in biodiversity initiatives; and
- Sets and reports performance against site-specific targets.

By the end of 2020, we anticipate that all our locations will have undertaken a biodiversity risk assessment, with action plans developed for sites where material biodiversity risks are identified.

Ecosystem Services

Ecosystem services are benefits obtained from natural ecosystems. These may be goods or raw materials, such as food, timber or fresh water. They also may be services carried out by ecosystems, including climate mitigation, erosion control and disease control. A company can both benefit from ecosystem services as well as impact them.

There are many situations where ecosystem services benefit our business. These include the provision of essential water supplies for our operations; management of forested land in our hydropower watersheds; rehabilitation of mined land by providing seeds of native plants, naturally re-colonizing microorganisms, flora and fauna; and restoration of ecosystem processes, such as nutrient, carbon and water cycles, that ensure long-term success.

Ecosystem services receive explicit consideration in our operations. For example, we deliberately incorporate the Brazil nut tree, which is economically important for the local community, into our rehabilitation efforts at our Juruti mine to support future community livelihoods. Our mines in Western Australia closely monitor potential stream salinity impacts from our operations on freshwater supplies.

A recent study has investigated the extent to which established rehabilitation at our Western Australian bauxite mines provides outdoor recreational opportunities as ecosystem services. A key finding was that perceptions of groups such as hikers or mountain bike riders vary depending on their respective needs. Hikers, for example, preferred forest with older, larger trees and an open structure, while bike riders enjoyed natural settings encompassing a variety of forest structures.

MINE REHABILITATION

Rehabilitation is a post-mining activity, but we begin planning for it as early as possible. This includes the very early stages of development for a new mine. When we inherit legacy obligations at sites that were mined long ago, we begin rehabilitation planning as soon as we recognize such an obligation.

We engage with stakeholders to develop a rehabilitation plan to ensure the site can be returned to sustainable use. In many cases, we strive to return the land to its natural state, such as forests, wetlands and grasslands. Where appropriate and in concert with government or local communities, our rehabilitation supports other productive land uses, including farming and residential, commercial or industrial developments.

We strive to lessen the impact of our mining operations by minimizing the environmental footprint for each mine. This includes minimizing the land disturbed for mining and progressively rehabilitating disturbed areas that are no longer required for operations.

Rehabilitation approaches vary across our mines in response to local biophysical conditions and rehabilitation objectives.

In certain locations, for example, naturally occurring sulfide minerals contained in overburden have the potential to release low pH (acidic) water when exposed to air, resulting in dissolved metal concentrations in surface water and groundwater. Some clay overburden materials also exhibit these characteristics. To prevent the potential release of acid and metals, we manage this material through selective handling, which may include encapsulation or sub-aqueous (underwater) placement.

CASE STUDY

Protecting a Western Australian Icon

A partnership between BirdLife Australia and Alcoa Foundation is working to reverse the decline of a well-loved species of birds in Western Australia. Three black

Baudin's black cockatoo

Photo credit: Keith Lightbody

cockatoos—the Baudin's and Carnaby's black cockatoos and the forest red-tailed black cockatoo—are currently listed as either endangered or vulnerable.

The birds are facing declining numbers as their habitat and food sources disappear due to a drying climate and urban, agricultural and industrial development. Alcoa Foundation and Alcoa employees are working to help by planting corridors of declining food plants, enhancing watering points and providing additional nesting habitat, explained Paul Sullivan, BirdLife Australia CEO.

"Under the Alcoa Community Cockatoo Recovery Partnership, BirdLife Australia is

engaging Alcoa employees and community members to measure and monitor local populations of all three species and deliver on-ground recovery actions," he said.

In 2019, the partnership facilitated community plantings of important black-cockatoo food plants, oversaw the installation of artificial nests on private properties, and conducted workshops and other events to educate community participants on surveying and helping the black cockatoos.

BirdLife also planned and coordinated the Great Cocky Count on April 7, 2019, engaging 750 Alcoa and community volunteers who counted 23,638 black cockatoos coming into night roosts at nearly 400 sites.
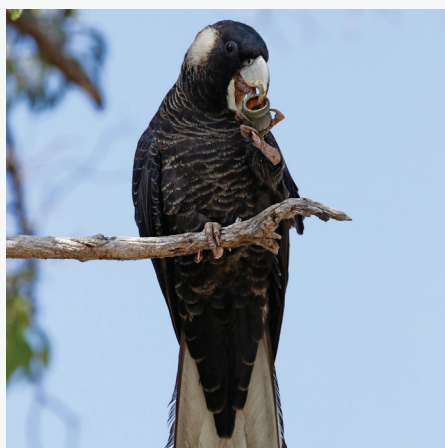
A section of a 40-year-old rehabilitated jarrah forest in Western Australia

Where a diverse and sustainable native ecosystem is the rehabilitation objective, we conserve and reuse topsoil. This valuable resource contains seeds, nutrients and microbes that are essential for successfully establishing diverse and sustainable vegetation cover after mining.

In addition to preserving topsoil, we apply many strategies to optimize the number of plant species we reestablish in rehabilitated areas. These include spreading collected and specially treated seeds and planting nursery-grown seedlings. We may use cuttings and tissue culture propagation techniques for species that generally do not produce viable seeds.

Mining and Rehabilitation Activity

During 2019, we had four active bauxite mining areas in Australia and Brazil and one active coal mine in the United States, which was fully curtailed in April 2019. A number of inactive mines also contributed to the year's total open area. We also have a minority equity interest in a bauxite mine in each of three countries—Brazil, Guinea and Saudi Arabia—but data from these mines is not included in this sustainability report.

Our goal is to maintain a corporate-wide running five-year average ratio of 1:1 or better (meaning less than one) for active mining disturbance (excluding long-term infrastructure) to mine rehabilitation. This will manage net expansion in the area of land disturbed.

The ratio for the 2015 to 2019 period was 0.97:1, which indicates we had a larger area rehabilitated or handed over compared to new disturbance. We expect the ratio to decrease as more areas at our closed mines in Suriname are returned to the Suriname government after rehabilitation.

Open Mine Area
Hectares

	Australia	Europe/ Africa	North America	South America	Total
2015	5,009	0	1,191	8,693	**14,893**
2016	5,351	0	1,128	8,804	**15,283**
2017	5,614	0	1,068	8,766	**15,448**
2018	5,739	0	1,003	9,027	**15,769**
2019	6,029	0	736	9,040	**15,805**

One hectare equals approximately 2.5 acres. Open mine area is the cumulative area of land that has not been rehabilitated, which includes active mines and land used for mining infrastructure. In Australia, the 2019 open mine area includes the Anglesea coal mine, which closed in 2015. The open mine area increased in 2019 mostly due to clearing for long-term infrastructure associated with the next mining region at the Willowdale mine in Australia. Increased rates of rehabilitation at the Huntly and Willowdale mines are planned to reduce area open after 2020. Area open in North America decreased largely due to the transfer of 192 hectares at the Friendsville Mine (coal mine in Illinois, USA), which we sold in 2016 and obtained a bond release during 2018.

Mining Land Disturbed/Land Rehabilitated
Hectares

	Open Mine Area (*Cumulative as of year-end*)	Area Disturbed (*Annual*)	Area Rehabilitated (*Annual*)
2015	14,893	1,195	1,293
2016	15,283	1,028	646
2017	15,448	1,173	1,008
2018	15,769	1,243	923
2019	15,805	1,368	1,140

One hectare equals approximately 2.5 acres. Open mine area is the cumulative area of land that has not been rehabilitated (including active mines and land used for mining infrastructure). Area disturbed means land used in each reported year for mining or for mining infrastructure (e.g., roads, shops, crushing equipment, conveyors). Area rehabilitated means land returned to natural conditions or to productive use (such as farming) after mining or decommissioning of mine infrastructure in each reported year. Generally, the open mine area in each reported year should be the open mine area from the preceding year plus any area disturbed and minus any area rehabilitated. A total of 192 hectares at the Friendsville Mine (coal mine in Illinois, USA) was not included in the open area for 2019 as the mine was sold in 2016 and the bond release was obtained in 2018.

Area Disturbed
Hectares

	Australia	Europe/ Africa	North America	South America	Total
2015	756	0	109	330	**1,195**
2016	631	0	51	346	**1,028**
2017	675	0	50	448	**1,173**
2018	675	0	48	520	**1,243**
2019	954	0	9	406	**1,368**

One hectare equals approximately 2.5 acres. Area disturbed means land used in each reported year for mining or for mining infrastructure (e.g., roads, shops, crushing equipment and conveyors). In Australia, the increase in 2019 was mostly due to clearing for long-term infrastructure associated with the next mining region at the Willowdale mine.

Area Rehabilitated
Hectares

	Australia	Europe/Africa	North America	South America	Total
2015	550	0	179	564	**1,293**
2016	290	0	114	242	**646**
2017	412	0	110	486	**1,008**
2018	550	0	113	260	**923**
2019	665	0	83	392	**1,140**

One hectare equals approximately 2.5 acres. Area rehabilitated means land returned to natural conditions or to productive use (such as farming) after mining or decommissioning of mine infrastructure in each reported year. The increase in area rehabilitated in 2019 was mainly due to an increase in area rehabilitated at the Huntly mine in Australia and an increase in areas returned to the government of Suriname compared to 2018.

"Alcoa's commitment to long-term, high-quality research in the rehabilitation of its jarrah forests in Western Australia is upheld as a global example of a company delivering on its rhetoric and finding the resources to properly fund research, both in-house and in partnership with universities. As I travel around the world, Alcoa's forestry research program is clearly seen as world leading in post-mining forest restoration. What makes this particularly remarkable is that Alcoa has achieved this in a global biodiversity hotspot. In our recent work with Alcoa, where we have partnered on work related to soil nutrients and optimizing biodiversity outcomes, their collegiality has been clear to see, and they are still pushing forward the boundaries of forest restoration by optimizing an already globally leading rehabilitation program."

Dr. Mark Tibbett
Professor of Soil Ecology
University of Reading

CASE STUDY

Advanced Technology Meets Mine Rehabilitation Assessment

Our team in Australia is using remote-sensing technologies to help evaluate bauxite mine rehabilitation efforts, which span thousands of hectares within the jarrah forest of southwest Australia. The task can be challenging due to the size of the area, but these technologies look to improve this important task.

More than 30 years ago, Alcoa of Australia jointly developed with the Western Australia state government criteria against which bauxite mine rehabilitation could be assessed for completion. Those criteria are reviewed and updated periodically, reflecting improvements in ecological understanding and changing community expectations.

The present criteria include 30 specific targets, nine of which could be evaluated with remote-sensing technology. These include tree stocking rates, tree growth, the presence of understory and ground fauna habitat.

In 2019, we had approximately 10,000 hectares (24,700 acres) of restored forest considered suitable for final sign-off with the government. Within this area, we evaluated light detection and ranging (LiDAR) on fixed wing aircraft, remotely piloted aircraft fitted with multispectral sensors, and Landsat imagery to collect the required information for final assessment and sign-off.

The remote-sensing technology enabled us to address completion criteria by:
- Detecting individual trees for estimation of stand density and canopy heights
- Assessing the structure (vertical and horizontal vegetation cover) of restoration and the surrounding unmined forest;
- Staging restoration on a trajectory to the forest reference; and
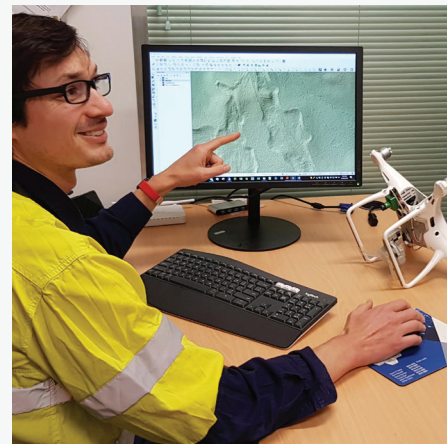
- Identifying surface terrain features such as erosion gullies underneath vegetation cover.

The results of the study were promising, and we continue to work with the government and Curtin University on the technology's applicability to mine rehabilitation assessment.

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Tailings Management

We manage impoundment facilities at active, inactive and closed sites around the world to store primarily two types of material—bauxite mine tailings and bauxite residue. Both materials are referred to generically as tailings.

Bauxite mine tailings are mud-like residues that remain after bauxite is washed at the mine site. Bauxite residue, which is a byproduct of the alumina refining process, consists of mud, some residual caustic soda and, in some cases, a coarse sand fraction.

Our strategic long-term goal for bauxite residue addresses our biggest challenge—reduce bauxite residue land storage requirements per metric ton of alumina produced by 15 percent by 2030 from a 2015 baseline. This metric remained steady through 2019, although we expect to see continued improvement with residue filtration technology now fully operational at our Kwinana and Pinjarra refineries in Australia.

Bauxite Residue Land Requirements
Square meters of land required per 1,000 metric tons of alumina produced

| 2015	2016	2017	2018	2019
52	51	50	49	49
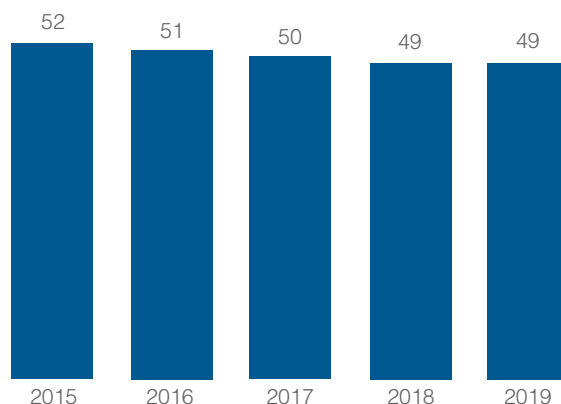
Construction and Design

Typically, we construct earthen embankments, or dikes, to form an enclosure for the tailings. The materials are deposited into the enclosure in slurry form and dried over time.

We keep some impoundments at their original height, with the perimeter embankment constructed to full height before material is deposited. We raise others over time, with the design governed by the type of tailings being stored and the method of deposition used.

The methods for raising tailings storage areas usually fall into one of the following categories:

- Downstream
- Center Line
- Upstream
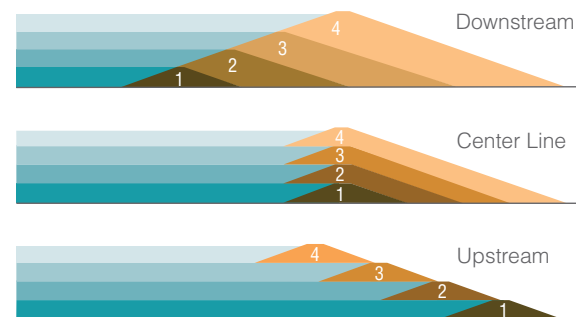
- Downstream: This method involves either building the embankments to full height as an initial construction or raising the impoundment height downstream from the initial dike, which is built from borrowed fill materials.
- Center line: Successive raising occurs in such a way that the axis (or embankment center line) of the dike remains in the initial position and coincides with the initial dike axis.
- Upstream: Successive levels of the containment dike are constructed on the consolidated and dried tailings previously deposited in the impoundment.

We use various combinations of these methods based on a range of factors, including climate, topography and the nature of the tailings.

All of our newly constructed bauxite residue storage areas include a composite base seal and an underdrain system to increase the rate at which water drains from the residue, increasing the residue's density and strength and reducing the hydrostatic pressure on the base seal. The use of dry stacking at some locations further

improves this process, and residue filtration is the next step in improving overall efficiency and safety associated with the stored tailings.

Risk Assessment and Management

We conduct a risk assessment and develop an operational plan for each location. We review and update both of these as appropriate throughout the facility's lifecycle.

Our risk assessment considers the following:

- Physical and chemical risk of the impoundment facility;
- Environmental risks, including earthquakes, droughts and heavy rainfall, that could impact the facility and its operation; and
- Other risks external to Alcoa and the facility, including regulatory and permitting risks.

The operational plan identifies mitigation and control measures to eliminate or avoid risk to the extent practicable; reduce risk by minimizing the likelihood or potential consequence of an unwanted event or condition that poses a risk; and detect, respond to and minimize the consequences if an unwanted event or condition occurs that poses a risk.

Management

We are an industry leader in the management of tailings and residue storage, with rigorous protocols that have been developed over decades of safe operating practice.

We focus on key elements of management and governance that are necessary to maintain the overall integrity of our impoundment facilities. These include:

- A governance structure that provides global oversight with clearly defined location responsibilities;
- Globally mandated standards covering planning, design, construction and operations;
- Long-term strategic plans, known as master plans;
- Capital plans that match the master plans;
- Timely implementation of capital projects;
- Qualified personnel in key roles, including civil engineering oversight at each location;
- Review and assurance, such as peer reviews of residue storage area design and third-party audits/inspections; and
- Emergency preparedness and response plans for unforeseen or extreme events.

In each region where we operate, we also apply a consequence ratings system as guided by either local regulations or internal Alcoa requirements. For example, we use the Brazilian National Mining Agency (ANM) standards in Brazil and the consequence rating system developed by the Australian National Commission on Large Dams (ANCOLD) in Australia.

We regularly review and update our standards, plans and governance to guide the safe and sustainable management of our tailings storage. We also look to improve the technologies we use to store the tailings and have spearheaded improvements in the management of impoundments. Some examples include:

- Storing bauxite tailings within the mined footprint to reduce disturbance of land;
- Progressively moving from traditional wet storage of bauxite residue to solar drying and stacking, where practical. This significantly reduces the potential for impacts on the surrounding environment;
- Using bauxite residue storage areas that are typically engineered embankments and have an internal composite liner system;
- Using underdrainage systems to reduce the water pressure on the embankments; and
- Implementing residue filtration technology, where bauxite residue is forced through very large filters that squeeze the water from the tailings to reduce the moisture content. The resulting filter cake has a moisture content low enough to allow for more conventional materials handling (conveying) and stacking.
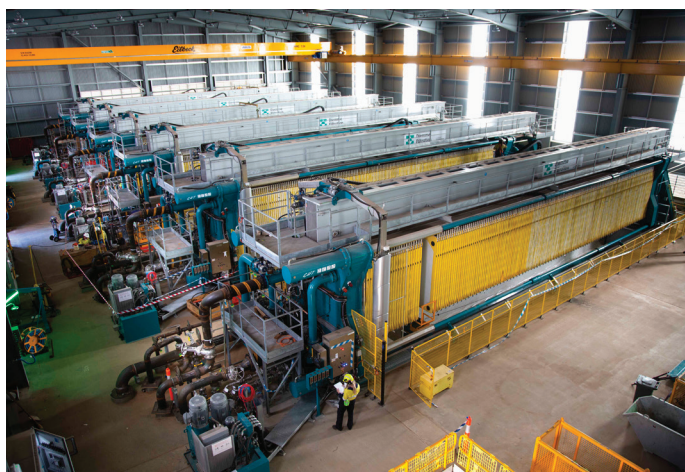
Pinjarra filtration system

Closure and Rehabilitation

We are focused on progressively closing and rehabilitating tailings storage areas. Installation of an appropriate closure (cover) system, effective management of water post-closure and tailings consolidation over time substantially reduce the risk of instability resulting from continued water infiltration.

We undertake field trials and fundamental research on tailings rehabilitation at many of our locations. This research aims to better understand the interaction between retained moisture and nutrient cycling in the cover layer as a means of optimizing the rehabilitation approach and identifying potential tailings area closure strategies.

Our current closure strategy incorporates the following main objectives:

- Long-term sustainability of the closure;
- Minimization of the impacts to the surrounding environment;
- Aesthetics of the closure so they are consistent with the expectations of external stakeholders and the social values of the surrounding land;
- Beneficial reuse of the post-closure residue area;
- Progressive closure during operations so the closure method is demonstrated and the entire closure burden is not shifted to the end of operations; and
- Minimization of potential leachate discharge.

Our early bauxite residue storage areas at the Kwinana refinery serve as an example of returning tailings storage areas to productive land use. Parts of the storage areas were incorporated into the Perth Motorplex, which opened in December 2000. There have been no issues related to managing the site in the context of it being a former bauxite residue storage area.

Photo credit: Perth Motorplex

Perth Motorplex

CASE STUDY

Dam Break Drill Boosts Emergency Preparedness

A full-scale dam break drill at our Poços de Caldas location in Brazil helped ensure first responders, residents and our employees are prepared in the unlikely event of a failure from one of the site's bauxite residue storage areas.

The storage areas are constructed to world-class standards and certified by a third party as safe and stable. Interest in our

management of both bauxite residue and mine tailings increased in the wake of fatal mining accidents from other companies, including one that killed hundreds in January 2019 near the city of Brumadinho in southeastern Brazil.

To keep community members and other stakeholders informed and ensure they are prepared, the location undertook the dam break simulation in June 2019. Such drills are part of a dam's mandatory emergency plan in Brazil.

When Alcoa settled in the Poços de Caldas area in the 1960s, our location was isolated. As a result of the city's growth, around 585 people now live in an area that could be impacted by a storage area failure.

During the drill's planning, we engaged with municipal authorities, fire brigades, police departments, community leaders, local media, residents and other stakeholders.

We conducted a tabletop simulation to share the emergency response plan, dam break details and scenarios to define the technical requirements. Impacted residents and our Poços de Caldas employees received evacuation instructions.

Brazil's civil defense organization coordinated the successful full-scale drill with the support of Alcoa, military police and local fire companies and utilities. Lessons learned were shared with all stakeholders and other Alcoa refineries globally. These included engaging all stakeholders, acting proactively and developing detailed plans for actions and reactions.

"The drill was great, because we now know to stay calm and leave if something happens to the dam," said Jandira Aparecida, who lives in the impact zone with her children and grandchildren. "Just knowing the authorities are attentive is a relief."

Our rehabilitation rate for residue storage areas has remained steady over recent years. We expect to see continued improvement as we progressively close the residue storage areas at the closed Suralco and Point Comfort refineries.

Bauxite Residue Storage Area Rehabilitation Rate
Percent of total area rehabilitated

2015	2016	2017	2018	2019
18	18	18	18	18
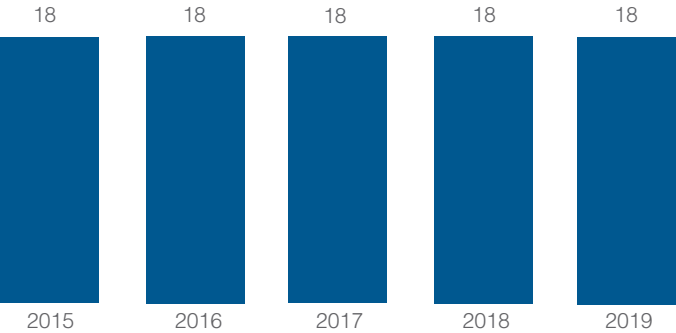
Facility Inventory

In accordance with the Mining and Tailing Safety Initiative, which is a group of investors co-headed by the Church of England, an inventory of our bauxite mine tailings and bauxite residue storage facilities is available. Download.

Waste and Spills

In line with the circular economy, we work to reduce or eliminate waste in our operations and keep resources in use for as long as possible.

We first focus on reducing waste generation at the source. We then work to increase reuse and recycling and manage materials in an environmentally protective manner.

Our waste management hierarchy consists of the following:

1. **Source reduction:** Reduce the volume or toxicity of waste at the source through changes in industrial processes, material substitution, segregation practices, maintenance activities and more sustainable procurement practices.
2. **Reuse:** Reuse the waste or industrial byproduct onsite or offsite for its original purpose or for another beneficial purpose.
3. **Recycling/composting:** Recover value and resources from wastes.
4. **Energy recovery:** Recover heat value from wastes.
5. **Treatment/disposal:** Reduce the volume, toxicity or other hazardous characteristics of wastes prior to disposal or discharge. Disposal is the least preferred option for waste management.

In 2019, we updated our waste management standard and communicated the requirements to all locations. These requirements include a site waste management plan; an inventory of all waste streams generated onsite; onsite waste storage areas that meet all local regulatory requirements; a comprehensive waste training program; and tracking of non-hazardous and hazardous waste metrics.

Landfilled Waste

Our landfilled waste increased 7.7 percent in 2019 compared to prior year. This was primarily due to:
- The landfill of demolition material from our former Poços de Caldas smelter in Brazil. This accounted for approximately 15 percent of the increase in landfilled waste;
- Materials generated from significant housekeeping and maintenance-related activities, including high-impurity alumina and carbon stockpile removal, dredging and sludge removal; and
- An increase in spent pot lining sent to the landfill due to supply chain disruption.

Our landfilled waste data excludes certain streams, such as bauxite residue, refining process waste and fly ash. We manage these particular materials separately with onsite storage or impoundment areas and do not send these materials to landfills. Overburden and rock generated from our mining activities, which are also not included in the data, are not considered waste because the materials are used for mine rehabilitation.

In 2019, we revised our long-term waste goal to focus on landfilled waste rather than by-product materials. This was due to a desire to emphasize waste reduction at the source and move from disposal to other options, including reduction, reuse and recycling, using the waste management hierarchy.

Our new goal is a 15 percent reduction in landfilled waste by 2025 and 25 percent by 2030 from a 2015 baseline.
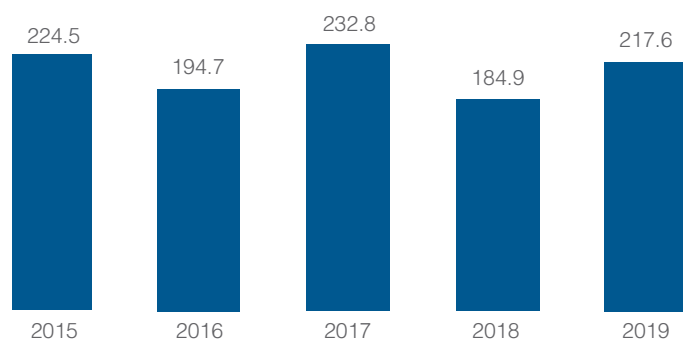
Landfilled Waste
Thousands of metric tons
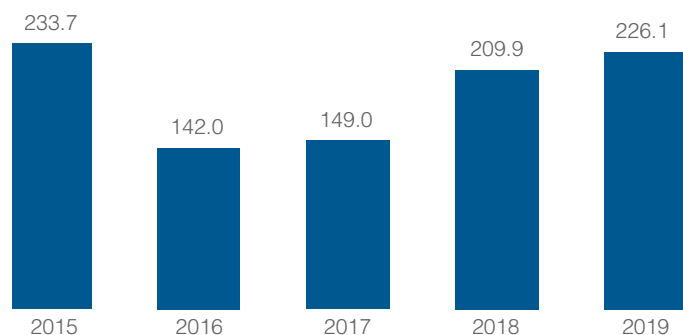
2015	2016	2017	2018	2019
233.7	142.0	149.0	209.9	226.1

Data changes from prior reporting are due to the removal of data from the La Coruña and Avilés smelters, which we divested in 2019.

Total Wastes Recycled/Reused
Thousands of metric tons

2015	2016	2017	2018	2019
224.5	194.7	232.8	184.9	217.6

Data changes from prior reporting are due to the removal of data from the La Coruña and Avilés smelters, which we divested in 2019.

Bauxite Residue

In 2019, we generated 23.2 million metric tons of bauxite residue (see the Tailings Management section).

Our collaboration with external organizations and universities on residue reuse opportunities continued in 2019.

Through the Alcoa Foundation, we are supporting research at the University of São Paulo that is focused on using bauxite residue in the manufacture of cement to help reduce that industry's GHG emissions and use of non-renewable raw materials. In parallel, we are working with the International Aluminium Institute to identify potential pathways for the adoption of bauxite residue in cement production and use.

The University of São Paulo research has demonstrated that it is technically feasible to replace a portion of the cement with bauxite residue for diverse types of cementitious products. Future research efforts will focus on investigating how these formulations behave when combined with steel rebars used in reinforced concrete. This is one of the most relevant aspects regarding durability and represents a primary interest for structural engineers.

In addition to our work in the cement industry, we continue to explore potential opportunities in Western Australia to use the coarse sand contained in bauxite residue as a construction material or general fill.

CASE STUDY

Waste—Not

At the Deschambault smelter in Québec (Canada), there are nearly 219 reasons why a focused effort on eliminating landfilled waste can be successful.

That's the number of metric tons of material the location kept out of landfills in 2019 when compared to 2016. Five of its top 10 wastes, not including spent potlining and dross, never reached the landfill during the year, with 100 percent being recycled or reused.

The location has set its sights on zero landfilled waste. A detailed roadmap determines the direction, while waste "budgets" for individual areas within the plant provide motivation. The location also has created a culture where waste is viewed as an opportunity—something with potential value.

Supporting the effort is a network of suppliers and customers to help the location recycle waste or find alternative uses. Carbon dust, for example, is sold for reuse as a raw material in the steel industry. Used refractory bricks are reused in cement plants as a raw material.

The location continues to tap into this network as it focuses on finding recycling or reuse opportunities for other waste materials.

We are also supporting a project through the International Aluminium Institute that could rapidly transform in situ bauxite residue into soil, depending on specific criteria. The research focuses on strategies that would consider initial residue properties, desired end land uses and the unique climate of each residue storage area.

This work is investigating the interactions between chemical, physical and biological drivers of remediation during initial stages of soil formation in bauxite residue. The study has progressed from microbially based remediation strategies that were tested in glasshouse trials to now being tested at field scale, with trial plots established at our Kwinana refinery in Western Australia.
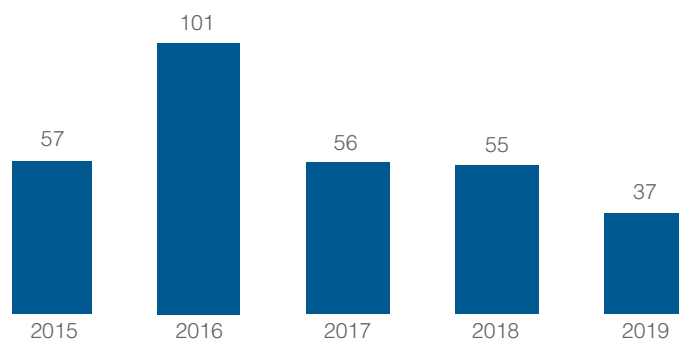
Bauxite Residue Intensity
Metric tons of residue per metric ton of alumina produced

2015	2016	2017	2018	2019
1.43	1.53	1.54	1.57	1.54
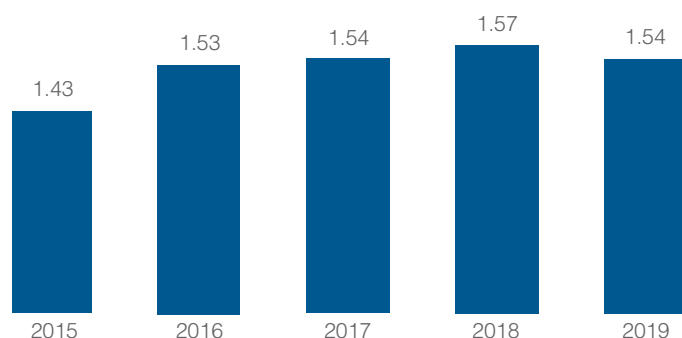
The increase from 2015 to 2016 was due to a combination of the curtailing of refineries that had lower residue-to-alumina ratios and a drop in the bauxite quality used in some refineries.

Spent Pot Lining

Spent pot lining is the carbon and refractory lining left from retired smelting pots.

Our approach to managing spent pot lining is to first minimize the volume we generate by focusing on reduction at the source via process optimization, which increases the lifespan of our smelting pots. This reduces the amount of required re-linings and replacements.

We continue to pursue ways to transform our spent pot lining into a raw material or fuel source for other industries. For example, the cement industry uses spent pot lining as both a fuel and raw material. It also can be used as a raw material in the production of steel and a fuel source in the manufacture of rockwool insulation.

We recycle and/or reuse SPL in accordance with applicable country-specific requirements.

Spent Pot Lining Recycled/Reused
Percent of spent pot lining generated

2015	2016	2017	2018	2019
57	101	56	55	37

Increased recycling in 2016 was the result of a focused effort to decrease the amount of spent pot lining in storage at several locations. Decrease in 2017 was primarily the result of reduced recycling of stored spent pot lining inventory.

Secondary Materials

In addition to bauxite residue and spent pot lining, we are actively seeking alternative uses for our secondary materials to avoid their disposal. These products include carbon, electrolytic bath, fly ash and secondary aluminas.

We use a three-tiered classification for our secondary materials:
- Commercial: Materials sold as a commercial product;
- Transition: Materials that have some limited commercial viability or can be placed with a user to derive a better financial outcome than landfilling; and
- Disposal: Materials that are typically landfilled or otherwise disposed.

In 2019, we began selling our electrolytic bath to manufactures of fluxes for the aluminum remelt industry. This new market will help increase the reuse of this high-volume byproduct.

We sold 148,380 metric tons of secondary materials in 2019, generating US$18.5 million in margin.

Spills

We deploy several operational control measures aimed at minimizing the impact of spills on the environment. These controls vary depending upon the nature of the material and the risk presented to the environment.

Control measures include secondary containment, inspection practices, work practices during loading/unloading operations and a variety of technology-based leak detection systems on critical piping and tank systems.

We require any uncontained spill or release of oils, process liquids or solids in excess of 20 liters with a potential

environmental impact to be reported internally as an incident, regardless of whether reporting to external agencies is required.

We define major spills as those meeting the criteria for a major environmental incident designation in the Alcoa Environmental Incident Management System, which includes spills that have the potential to cause significant harm to the environment. In 2019, we had zero major spills.

Spills		
	Spills over 20 Liters	Major Spills
2015	330	1
2016	249	0
2017	235	0
2018	323	1
2019	355	0

Increase in spills greater than 20 liters in 2018 was the result of a campaign to increase reporting transparency.

CASE STUDY

A Fresh Look at Waste

A fresh look at two wastes streams at our Intalco Works smelter opened the door to beneficial reuse, helping the location meet waste-reduction goals.

Operators at the facility in Washington state in the U.S. have improved processes in the rod shop, where residual crust is cleaned from used anodes. The metal rod inserted into the anode is also removed in the shop. Both operations result in fine particles that, until recently, were gathered by the same dust-collection system and then landfilled.

A process change along with new equipment enabled the dust streams to be separated, allowing the crust fines to be reused

in the smelting process and the metal fines to be sold for use in other industries. The change diverts 1,500 metric tons of waste from the landfill annually.

A second project resulted in reclassifying sludge from Intalco's onsite wastewater treatment plant from hazardous to non-hazardous, opening the door to reuse possibilities.

The sludge was designated as hazardous since the plant treated the leachate from the site's onsite landfills, which contain a hazardous waste known as spent potlining. The landfills were closed in 1990 and capped in 2011, but the leak detection

system—intended to determine if leachate was breaking through containment liners—was receiving fluid. This was despite the leachate collection system being dry, which indicated no leachate was present from the closed landfill.

A study conducted by external experts found that the fluid was rainwater, which never contacted the spent potlining. This meant the wastewater treatment plant was not receiving any landfill leachate. As a result, the state reclassified the wastewater sludge as non-hazardous in 2019. Intalco has started exploring possibilities for the sludge's reuse.

Water

6 CLEAN WATER AND SANITATION

9 INDUSTRY, INNOVATION AND INFRASTRUCTURE

12 RESPONSIBLE CONSUMPTION AND PRODUCTION

14 LIFE BELOW WATER

6 ENVIRONMENTAL PERFORMANCE

Fresh water is a precious resource and critical raw material in our operations, particularly for ore processing, cooling, casting, rolling, dust suppression and potable uses.

Our power stations, refineries and casthouses are our largest users of water. Within our operations, the main consumptive water uses are evaporation from tanks, vents and storage, entrainment in tailings and uses within our casting locations.

In some countries, such as Canada, Iceland, Norway and parts of the United States, water is plentiful and even powers some of our smelters via hydroelectric dams. The situation is markedly different for our operations in Western Australia, where the drying climate is a challenge. In Brazil, we manage our water use to account for high seasonal variation in rainfall.

Our operations in water-scarce locations recycle and reuse water multiple times through the process until it is lost to evaporation or entrainment. Minimal discharges occur at these sites. Other facilities, including our Warrick power station in the United States and smelters in Europe, discharge most of the water that they withdraw for non-contact cooling purposes to the same environment from which it came.

Many of our facilities also discharge rainwater that is captured within the site but not used in the process. These diversions are not included in our water balance, which aligns with the Minerals Council of Australia's Water Accounting Framework that we have adopted.

Our 2019 net water consumption was 812.9 million cubic meters, which was a 0.1 percent decrease compared to 2018. Our locations in water-stressed areas had a net consumption of 46.5 million cubic meters. This was a 14.1 percent increase compared to the prior year.

The increase in water consumption at our sites in water-stressed areas was due to a variety of factors that included:

- Rainfall that was well above average at our Alumar location in Brazil, which meant the location captured more rain for use in its processes. The location also used extra water for construction dust suppression and had more open residue areas due to a project delay, which resulted in increased water inputs due to the larger open area.
- A relatively dry year in Western Australia, which increased both evaporation from ponds and sprinkler use for dust suppression at the refineries and mines.

"Alcoa Foundation has partnered with the Peel-Harvey Catchment Council to improve stewardship of our waterways. The Serpentine River, one of the three rivers that flows into the internationally recognized Peel-Yalgorup Ramsar Site, is in poor condition. A three-year funding commitment from the foundation through our Connecting Corridors and Communities: Restoring the Serpentine River project has enabled us to understand the ecology of the river, to identify and prioritize actions to improve its health and to make a start on its restoration. This commitment also has helped us to better connect with our community, including the local Noongar people as Traditional Owners of the land and water, to recognize the benefits that the river provides to us and to commit to action to take better care of it."

Dr. Steve Fisher
Program Manager, Science and Waterways
Peel-Harvey Catchment Council

Our strategic long-term goal is to define and implement a program focused on enhancing water-use efficiency at locations in water-scarce areas by 2020 and define specific water-use reduction targets for 2025 and 2030.

To achieve that goal, we updated our water and wastewater management standard in 2019 to be aligned with ICMM's water stewardship framework and the Water Accounting Framework. We also established a new target—reduce the intensity of our total water use from Alcoa-defined water-scarce locations by 5 percent by 2025 and 10 percent by 2030 from a 2015 baseline. A 2018 assessment of our water-related risks using the World Resource Institute's Aqueduct tools informed both the standard and goal.

A major requirement of our new standard is the development and maintenance of a water management plan at each operating location that considers the following:
- Current and alternative water sources;
- Security of water supplies;
- Water reduction, substitution, reuse and recycling programs; and
- Risks of contamination of water resources and mitigating actions.

The standard also requires a documented water balance for each location that is reviewed and updated at least every five years; a risk-based monitoring program; access to safe, high-quality potable water; and wastewater treatment facilities that are operated and maintained in accordance with permit conditions and standard industry practices.

We encourage all locations, even those in water-rich areas, to look for ways to reduce consumption and discharge, use fit-for-purpose sources of water, and increase recycling and other opportunities through advanced technologies and process improvements.

Our Kwinana and Pinjarra refineries in Western Australia, for example, have the capability to reduce their freshwater use by a collective 2.2 gigaliters (581 million gallons) annually through an innovative technology called residue filtration. (See the Tailings Management section.)

Freshwater Use Intensity
Cubic meters of water per metric ton of primary aluminum produced

2015	2016	2017	2018	2019
13.5	13.2	13.7	14.0	14.6
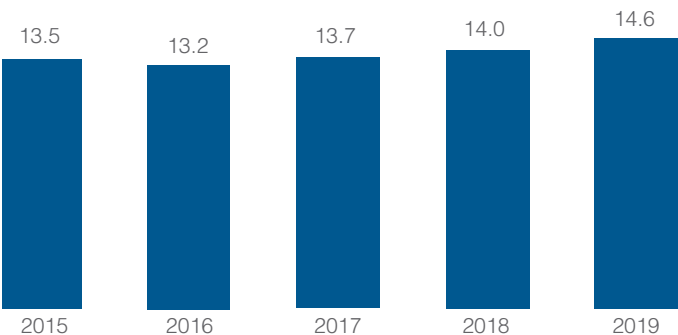
Freshwater use reflects only fresh water used to directly manufacture products. It excludes rainwater to encourage reuse of alternative sources and large volume, once-through water usage from our energy facilities. The intensity data represents the combined impact of refining, smelting, casting and rolling operations indexed to metric tons of primary aluminum production (refining is included at a ratio of 1.9 metric tons of alumina to 1.0 metric tons of smelted aluminum). Data changes from prior reporting are due to the removal of data from the La Coruña and Avilés smelters, which we divested in 2019, and improved accuracy around water balances and measurements.

CASE STUDY

Nature Does the Work

Our Intalco Works aluminum smelter let nature help decrease the site's stormwater runoff and improve the quality of the water in the process.

Intalco, located in Washington state in the U.S, manages stormwater runoff between its six potline buildings using long ditches with asphalt sides and a concrete bottom. The ditches empty into a treatment pond, where suspended solids sink to the bottom before the water is discharged into the Strait of Georgia.

A summer intern researched natural water filtration and naturalized grasses, ultimately proposing the use of bioswales between the buildings. Bioswales are vegetated ditches that enable natural water filtration and evapo-transpiration, which is when water evapo-rates from the soil and plants. The result is less stormwater and fewer suspended solids reaching the treatment pond.

Intalco has converted two stormwater ditches by replacing the asphalt slope on one side with a 2-meter-wide (7-foot-wide), multi-ter-raced embankment dotted with self-sustain-ing native plant species. The goal is to convert all six stormwater ditches to bioswales.

Total Water-use Intensity—Locations in Alcoa-defined Water-stressed Areas

Cubic meters of water per metric ton of alumina produced

Year	Value
2015	3.26
2016	3.17
2017	3.13
2018	3.21
2019	3.52
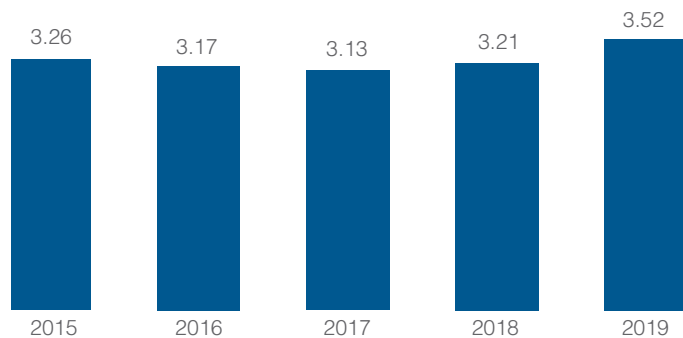
The intensity data represents the combined impact of mining and refining operations in water-stressed areas indexed to metric tons of alumina production (mining is included at a ratio of 2.85 metric tons of bauxite to 1.0 metric tons of alumina). Total water use includes the change in storage to accurately reflect years when water is used within our process.

In addition to our internal water initiatives, our locations actively engage with government agencies and non-governmental organizations focused on water quality and conservation. Some of our employees serve on local water boards and committees, while others volunteer their time for specific projects. We also provide financial support for water-based community initiatives primarily through Alcoa Foundation.

CASE STUDY

Restoring Waterways, Revitalizing Communities

Three environmental organizations + Alcoa Foundation funding = The restoration of three rivers + one estuary. This winning equation is positively impacting the economic, environmental and social health of numerous communities across the Peel-Harvey Catchment in Western Australia.

Collectively called Three Rivers – One Estuary, the initiative is addressing the impact of land clearing, agricultural and recreational land use, urban development, climate change and other threats on these waterways.

The initiative encompasses the following multi-year projects:

- Restoring the Serpentine River Partnership: Led by the Peel Harvey Catchment Council, this project is improving the quality of the Serpentine River.
- Three Rivers Partnership: Greening Australia is working to improve the condition of the Serpentine, Murry and Harvey rivers, reverse habitat loss and integrate large-scale restoration and carbon sinks into the area's fragmented landscape.
- Restoring the Peel Harvey Estuary Partnership: The Nature Conservancy is investigating options for improving the estuary, which is internationally recognized as a wetland of significance under the Ramsar Convention.

Where possible, the three organizations work together to complement or align with each other's work, especially in community engagement and revegetation efforts. Other actions taken independently or collectively include shellfish reef restoration, river health assessments, bank stabilization and weed control. Alcoa employee and community volunteers support the efforts.

"The Alcoa Foundation has brought wonderful benefits to Mandurah and the Peel-Harvey estuary through the grant to The Nature Conservancy for the remarkable project of restoring some of the native shellfish reefs in the estuary," said Paddi Creevey, chair, Peel Development Commission. "Having such an internationally recognized

Photo credit: Murdoch University

Native mussels fitted with tiny devices to assess their health are placed in cages throughout the Peel Harvey Estuary.

and highly respected organization operating in our region really helps lift the status of the local research work being done to protect the Peel-Harvey Estuary, the life-blood of our community. The project's valuable engagement with local schools, collaboration with the local Marine Men's Shed and generation of much-needed local employment are just some of the long-term benefits to our community that could have only been achieved through the generosity of Alcoa Foundation."

2019 Water Balance—All Locations
Million Cubic Meters

	Water Withdrawn				Water Discharged			
	Category 1	Category 2	Category 3	**Total**	Category 1	Category 2	Category 3	**Total**
Surface Water	35.4	655.5	19.6	**710.6**	5.3	649.1	0.8	**655.2**
Groundwater	1.9	17.3	3.1	**22.4**	0.0	6.9	2.6	**9.5**
Seawater	0.0	0.0	65.1	**65.1**	0.0	0.9	89.6	**90.5**
Third-party Water	3.5	6.5	0.9	**10.9**	0.1	0.0	0.1	**0.3**
Consumption	-	-	-	-	5.6	13.8	38.0	**57.4**
Total	**40.8**	**679.4**	**88.8**	**809.0**	**11.0**	**670.8**	**131.1**	**812.9**

Category 1 water is of a high quality and suitable for most purposes with little or no treatment. Category 2 water is of a medium quality and suitable for some purposes, such as irrigation. Category 3 water is of a low quality and suitable for limited purposes without significant treatment. Categories 1 and 2 are equivalent to the ICMM High Quality definition, and Category 3 is equivalent to the ICMM Low Quality definition. Groundwater includes produced water, which is water entrained in ore. Consumption consists of evaporation and entrainment. The 2019 change in storage volume was -3.9 million cubic meters, and 164 million cubic meters were recycled/reused in the process. The sum of categories may vary from the totals due to rounding.

2019 Water Balance—Locations in Alcoa-defined Water-stressed Areas
Million Cubic Meters

	Water Withdrawn				Water Discharged			
	Category 1	Category 2	Category 3	**Total**	Category 1	Category 2	Category 3	**Total**
Surface Water	6.0	1.8	15.0	**22.8**	0.1	1.4	0.0	**1.5**
Groundwater	0.4	11.9	3.1	**15.5**	0.0	1.2	0.9	**2.0**
Seawater	0.0	0.0	0.0	**0.0**	0.0	0.9	0.0	**0.9**
Third-party Water	1.0	2.8	0.9	**4.8**	0.0	0.0	0.0	**0.0**
Consumption	-	-	-	-	4.7	3.9	33.5	**42.1**
Total	**7.5**	**16.5**	**19.1**	**43.1**	**4.8**	**7.4**	**34.3**	**46.5**

Data is for our Alumar refinery in São Luís, Brazil and the Huntly mine, Kwinana refinery, Pinjarra refinery, Wagerup refinery and Willowdale mine in Australia. The 2019 change in storage volume was -3.4 million cubic meters, and 142 million cubic meters were recycled/reused in the process. The sum of categories may vary from the totals due to rounding.

Emissions

To manage our air emissions, we develop internal standards that are designed to meet or exceed all applicable emissions and air-quality regulations.

The manufacturing process at an Alcoa location determines the types of air emissions. Most sulfur dioxide and fluoride emissions come from our smelting operations, while our refineries account for the majority of our mercury emissions. Greenhouse gases are emitted from both our smelting and refining operations. (See the Climate Protection section for a discussion on GHGs.)

We have industry-leading capability on controlling mercury emissions in the alumina refining process. We developed two primary mercury emission-reduction technologies in collaboration with leading academics and experts in the field. The development of the technologies was also guided by mercury mass balances that we conducted at all of our refineries to account for mercury entering and leaving the system.

The first technology condenses elemental mercury from gas streams, allowing controlled separation and safe disposal. The second technology, which we have patented, uses a chemical additive to stabilize the mercury through sections of the process where it could otherwise be emitted. We apply our knowledge and these technologies at all of our locations to reduce the emissions of mercury to the environment.

We continue to work with our locations to minimize releases of all emissions in a cost-effective manner, especially where global environmental challenges are guiding us to expedite actions necessary to reduce our environmental impacts.
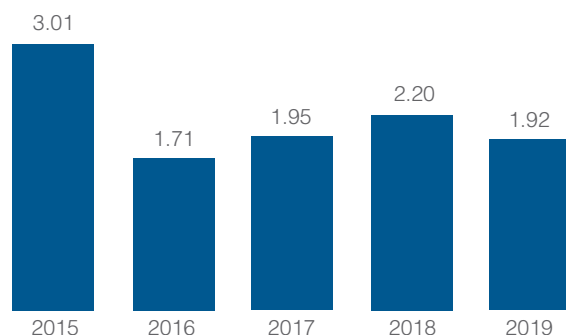
Mercury Emissions Intensity
Grams per thousand metric tons of alumina produced

2015	2016	2017	2018	2019
0.17	0.11	0.13	0.15	0.13
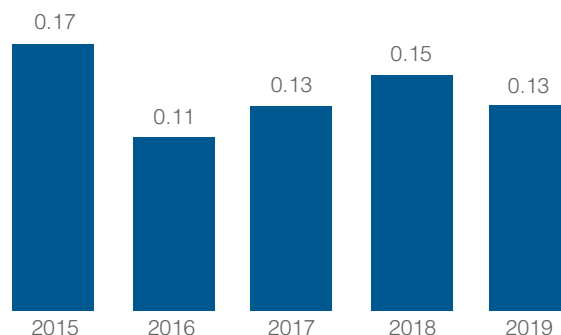
The decline in intensity in 2016 is due to the closure of the Suralco refinery. The increase in 2017 is the result of higher levels of naturally occurring mercury within the bauxite we consume and process upsets at one refinery. Data changes from prior reporting are due to actual data replacing estimated data. Estimated data has been used at some locations for 2019.

Mercury Emissions
Thousands of kilograms

2015	2016	2017	2018	2019
3.01	1.71	1.95	2.20	1.92

The decline in 2016 is due to the closure of the Suralco refinery. Data changes from prior reporting are due to actual data replacing estimated data. Estimated data has been used at some locations for 2019.
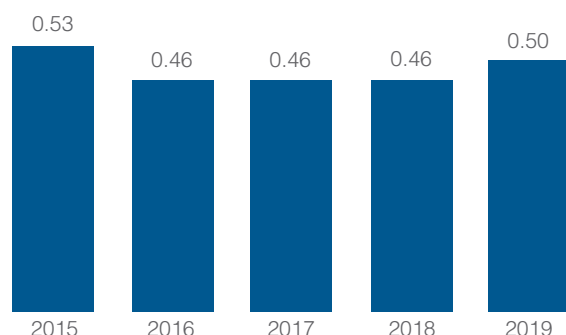
Fluoride Emissions Intensity
Kilograms per metric ton of primary aluminum produced

2015	2016	2017	2018	2019
0.53	0.46	0.46	0.46	0.50

Data are for electrolysis operation only. Data changes from prior reporting are due to replacing estimated data with actual data at one site. The increase in 2019 was due to process instabilities at several locations. Data changes from prior reporting are due to the removal of data from the La Coruña and Avilés smelters, which we divested in 2019.

Nitrogen Oxide Emissions
Thousands of metric tons
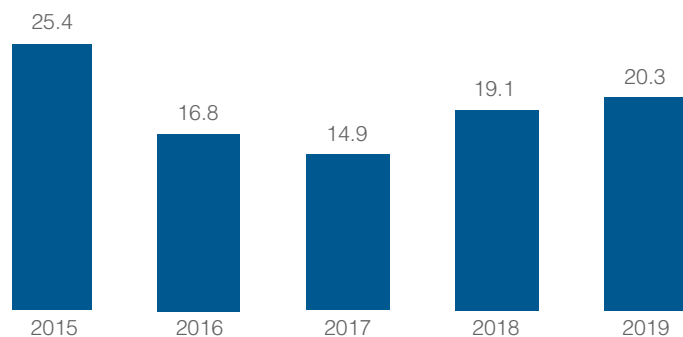
Year	Value
2015	25.4
2016	16.8
2017	14.9
2018	19.1
2019	20.3

The significant decline in 2016 was due to facility curtailments. The increase in 2018 was due to increased generation at the Warrick Power Plant, while the increase in 2019 was due to increased production and better emissions data at a few locations. Data changes from prior reporting are due to the removal of data from the La Coruña and Avilés smelters, which we divested in 2019.

Sulfur Dioxide Emissions
Thousands of metric tons
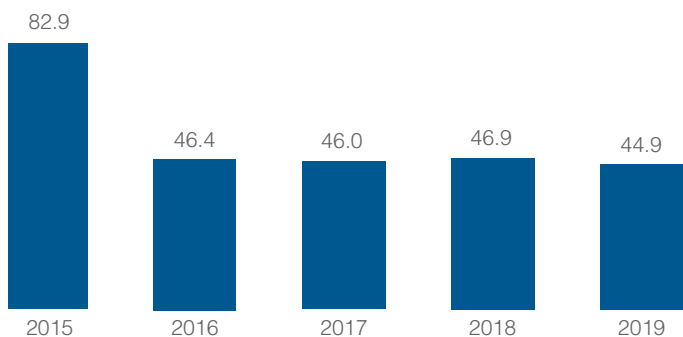
Year	Value
2015	82.9
2016	46.4
2017	46.0
2018	46.9
2019	44.9

The significant decline in 2016 was due to facility curtailments. The increase in 2018 was due to increased generation at the Warrick Power Plant. Data changes from prior reporting are due to the removal of data from the La Coruña and Avilés smelters, which we divested in 2019.

Volatile Organic Compounds Emissions (Rolling Operations Only)
Metric tons

Year	Value
2015	432
2016	485
2017	555
2018	589
2019	584
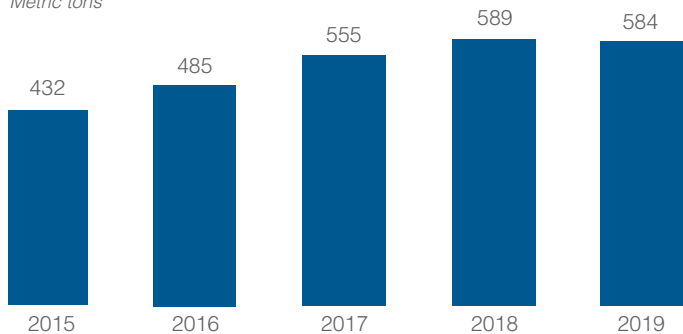
The increases in 2016, 2017 and 2018 were due to additional production of rolled aluminum products within permitted emission levels.

Fugitive Emissions

Fugitive emissions, such as dust, are generally defined as those that are not emitted or released from a chimney, stack or vent.

Controls to manage or minimize fugitive emissions from our mining and process operations include:

- Watering haul roads and bauxite residue areas, using binders on storage piles and incorporating vegetative covers where possible to minimize windblown dust;
- Using weather forecasts to help guide decisions regarding the use of additional controls during periods of unfavorable weather conditions; and
- Implementing capture and control systems for loading/unloading, material handling, smelting and other process operations.

We frequently employ visual-emission observation and ambient-air monitoring as tools to verify the effectiveness of these controls.

Environmental Compliance

Wherever we are located, our operations adhere to all applicable environmental laws and regulations and, in certain cases, meet our more stringent internal standards.

Our Compliance Committee comprises leaders from internal audit, ethics and compliance, legal, and environment, health and safety. It monitors EHS compliance-related matters to ensure that the appropriate level of oversight is in place depending on risk level. We also conduct a quarterly compliance review that includes our chief executive officer, chief financial officer and general counsel.

Our robust environmental compliance tracking system ensures that we rapidly correct actual and potential incidents. We also use a review process to confirm that environmental permit applications, draft permits and final permits are effectively reviewed and submitted in accordance with regulatory requirements.

We encourage reporting of all deviations, no matter how small, so we can continuously improve our compliance management system.

Environmental compliance assessments are integrated into our risk-based EHS assessment process. We conduct these assessments based on operational risks, and each is customized to address a location's current needs and challenges. The assessment team, which is composed of internal and/or external subject matter experts, works collaboratively with locations to review and address challenges.

We also actively engage in regulatory rulemaking at all levels of government. We accomplish this through advocacy via regional aluminum associations and industry partnerships on shared issues at various regulatory levels, including federal, provincial and local, and through direct communication with state and local governments.

Our objective is to work collaboratively with regulatory authorities so that the outcome of major rulemaking meets the needs of society.

As part of our regulatory development process, we monitor risks and potential business impacts. This process includes assessing the timeframe available to contribute to a regulatory development so we can appropriately engage stakeholders involved with the rulemaking process.

In 2019, we had five non-compliance issues related to our environmental practices that resulted in fines or penalties. These included a landfill leachate spill in Arkansas (USA) resulting in a US$32,500 fine and the release of total fluoride and carbon monoxide emissions over permitted levels in the state of Washington (USA) for a US$27,500 fine.

Environmental Non-Compliances

	Total	Significant	Fines and Penalties (U.S. dollars)
2015	3	0	70,750
2016	3	0	19,125
2017	5	0	81,860
2018	3	0	141,207
2019	5	0	70,500

We define a significant non-compliance as receiving a fine or penalty exceeding US$100,000.

Environmental Capital Expenditures

Our annual environmental capital expenditures vary based on the number and type of projects implemented. In 2019, we spent approximately US$95 million in projects that primarily focused on improving bauxite residue management.

For any capital expenditure request exceeding US$2 million, including those not focused on environmental projects, members of our corporate
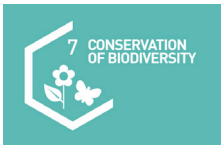
environmental staff conduct a review to ensure that the work incorporates best practices and the final project will minimize additional environmental impact.

Environmental Capital Expenditures
Millions of U.S. dollars

Year	Value
2015	122
2016	83
2017	92
2018	145
2019	95
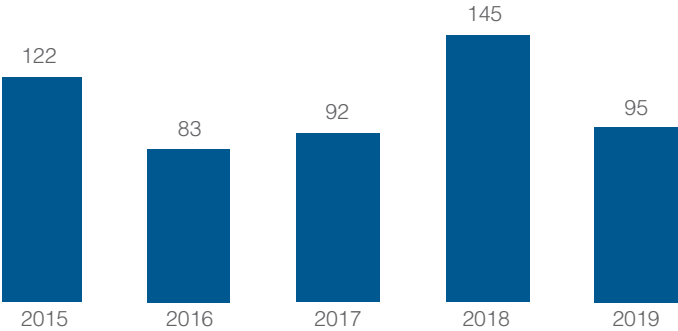
Facility Stewardship and Transformation

We recognized long ago that facility closure and remediation/restoration were integral aspects of a holistic sustainability program and critical to the welfare of our stakeholders.

To create clear accountability and bring a consistent approach to our global activities, our centralized Transformation Group manages all closed operations. The group also has responsibility for managing any environmental liabilities at our operating locations and ensuring that appropriate accounting reserves are established and updated as necessary.

Our approach to asset management covers the entire life cycle of a facility and includes established plans for ongoing stewardship during operation and the end-of-life stage of the facility. Throughout each stage, we consider it imperative to engage with stakeholders to ensure that their input and the social agenda are taken into consideration.

Our Transformation Group maintains an estimate of scope considerations and costs for closure for each operating location. This estimate considers input from known stakeholders who are periodically engaged as part of routine outreach programs. Our Transformation Group is also a key participant in asset portfolio reviews to ensure that this input is included in any assessment of closure scenarios.

We spent US$100 million on stewardship and transformation projects at 47 locations around the world in 2019. Many were at non-operating locations that were once operated by us or a predecessor. The remaining projects were at operating locations or sold facilities with retained environmental responsibility.

2019 Transformation Spend
Millions of U.S. dollars

Activity	Spend
Mine Reclamation	37
Demolition at Closed Locations	29
Environmental Remediation	17
Closure of Bauxite Residue Areas at Closed Locations	11
Spent Pot Lining Disposal at Closed Locations	3
Landfill Closure	3
Total	**100**

Includes reserve and expense spend.

Alcoa Foundation plays an important role in our facility transformation by providing funding to local non-governmental organizations to help impacted communities. In 2019, for example, the foundation invested US$270,000 in projects focused on education and community enhancements in Suriname.

Remediation Approach

As science and technology advance, we adapt our production practices to minimize environmental impact. However, some of our historical operating practices, which were legal and acceptable in their time, require attention today. We are committed to remediating those sites so they can be repurposed to benefit the local community.

The primary objective of any remediation project is the protection of human health and the environment. As part of this, we first use sound scientific assessments to understand the environmental condition. We then identify remedial solutions that are protective, feasible and compatible with current or likely future use of the facility. This requires balancing multiple internal and external needs, desires and expectations while keeping good science and constructability as key drivers in selecting a remedial approach.

Closed Facilities

Should we need to make the difficult decision to close a facility, we work closely with relevant stakeholders to develop a post-operation strategy. The goal is to optimize the land and assets that can be reused or redeveloped to enable the facility to be reused, generating jobs and a tax base for the community.

Some facilities can be repurposed with few changes. Others may require remediation, major modification or demolition.

At our former smelter in Rockdale, Texas (USA), we completed the removal of the aluminum smelting equipment during 2019 and developed plans for the demolition of various ancillary facilities that will be completed in 2021.

We were also successful in leasing several former potroom buildings in 2019 to a technology company that has installed blockchain infrastructure and hired local staff. Another blockchain computing company leased buildings and land and began deploying equipment during the year. Both companies are taking advantage of the extensive electrical infrastructure and unique buildings at the 13,354-hectare (33,000-acre) location.

A major focus of our work in 2019 continued to be decommissioning and remediating the 575-hectare (1,421-acre) Point Henry complex in Victoria, Australia, which closed in 2014. The Point Henry 575 Concept Master Plan envisions a mixed-use redevelopment with numerous types of residential, commercial and recreational subdivisions. The Victorian state government recently published its land use master plan for the greater Geelong area and adopted many of the recommendations in the Point Henry 575 Concept Master Plan.

We substantially completed the Point Henry site's demolition and decommissioning work in 2019. In total, we have removed and recycled approximately 60,000 metric tons of metals and 50,000 metric tons of other materials, and we have processed approximately 300,000 cubic meters of concrete for reuse on the site. We also completed studies to identify and define potential environmental issues, and we are progressively submitting our remediation plans.

At our former 150-megawatt coal-fired power station in Anglesea, Australia, which closed in 2015, we substantially completed the removal of the high-tension power line that

CASE STUDY

Meeting Special Needs in Suriname

A training program funded by Alcoa Foundation is helping teachers in Suriname provide potentially life-changing vocational and environmental education to students with special needs.

Prior to the program, which is a collaboration between IUP Research Institute and Vanguard Community College, teachers in Suriname received no formal training on working with special needs students.

The program involves 11 weeks of training on age-appropriate methods for teaching life and job skills that are needed in Suriname. It also provides teachers with skills and resources to begin environmentally focused initiatives in their schools, including constructing a sustainable garden to grow vegetables for consumption or sale.

"I always wanted to teach the children outside of the classroom, especially in gardening, because a lot of them have difficulty learning," said Samantha Bouterse, a teacher at the Samuel School for Special Education. "We had the space, but not the garden and the tools to do so. I also struggled with the knowledge about how to plant, compost and teach children to grow flowers and vegetables. The students love it and ask me to come to the garden every day."

Added Tiffany Moesnadi, who teaches at the Montresor School for Special Education, "A lot of the kids in my school are children of farmers. It's good that we now can teach them everything about planting, gardening and composting. They have seen a lot at home on their parents' farms, but now we are able to give them the background information in a way they can understand. We also can show it to them in the garden."

Each participating teacher must complete a final project that covers one of four subjects—social skills; children's rights and safety; diversity and inclusion; or environmental and vocational issues. The project must result in a new policy being implemented in the teacher's school.

connected the power station to the Point Henry complex. As part of this process, we are rehabilitating the right-of-way property, terminating the easements and turning over the land with no restrictions to the various owners. We also made significant progress on major earthmoving activities within the mine as we work to finalize closure plans.

During 2019, the Victorian Department of Environment, Land, Water and Planning (DELWP) continued to harvest winter water flows from the Anglesea River and stored the water in one of our Anglesea site's former ash ponds. DELWP distributed this water as needed over the summer to maintain the river's flow in order to mitigate impacts from naturally occurring acid soil within the adjacent national park.

In Suriname, we concluded our negotiations with the government to terminate the 1958 Brokopondo Agreement, under which we have operated the Suralco mines, smelter, refinery and Afobaka hydroelectric assets. As part of the initial agreement, we transferred ownership of the Afobaka hydroelectric project to the government on Dec. 31, 2019, years earlier than required under the Brokopondo Agreement.

The new agreements document the detailed international standards that will be followed to remediate the legacy environmental liabilities, close mines and decommission the alumina refinery associated with these historic operations.

Concurrent with our negotiations with the government, we continued discussions with various stakeholders regarding the creation of a potential industrial park that would use the infrastructure, port and utilities from the closed refinery. Many of the initial potential tenants would process Suriname's resources, such as timber, into higher-value products, helping create jobs and a tax base in the area.

At our closed Massena East smelter in New York (USA), we continued to work with the St. Lawrence Regional Development Authority and the New York Power Authority (NYPA) to help market the site to potential businesses. A data management firm that is leasing our former smelter buildings continued to build out its blockchain computing base in 2019.

The company that purchased our former Portovesme smelter site in Italy continued to plan for the facility's potential restart during 2019. We expect to complete our soil remediation work at the site in 2020. We also expect to complete soil remediation work at our Fusina, Italy, location in 2020. In Poços de Caldas, Brazil, we began demolishing the smelter buildings in 2019.

Operating Facilities

In Lake Charles, Louisiana (USA), we completed the investigation and design for the remediation of subsurface soils impacted by prior site operations. Implementation is planned for 2020. We also completed the first phase of investigation for the remedial design of a closed landfill at our smelter operation in Mosjøen, Norway.

In the fourth quarter of 2019, we announced the permanent closure of our fully curtailed refinery in Point Comfort, Texas (USA). As part of the permanent closure, we are currently developing plans to decommission the facility, remediate legacy environmental liabilities and redevelop the land for industrial reuse. We also continued to operate a groundwater collection system adjacent to a bauxite residue disposal area. The collection system's ongoing operation will improve the remediation of impacted subsurface groundwater conditions.

In 2019, we received a determination from the U.S. Environmental Protection Agency (EPA) regarding its five-year review of the remedy for prior mercury contamination in Lavaca Bay near our Point Comfort operations. The agency said the current remedy continues to be protective of human health and the environment.

Environmental Responsibilities

During 2019, we continued to remove residual contaminated soil, treat groundwater, maintain closed landfill covers, and monitor surface water and groundwater systems at facilities we no longer own but have retained remediation obligations.

At closed bauxite residue storage areas in the U.S. states of Illinois and Alabama, we maintained stormwater conveyance channels, monitored and maintained the vegetative cover, and repaired access roads and other erosion-impacted features to ensure the remedy cover remains compliant with requirements.

We received a determination from the U.S. EPA's five-year review process that the remedy for the main portion of the site in Illinois continues to be protective of human health and the environment. Further investigation and design work were completed in 2019 for several adjacent industrial and residential properties that will be remediated by 2021 under the U.S. EPA agreement.

We continued to conduct operations at the Copano bauxite residue storage facility near Corpus Christi, Texas, in compliance with our negotiated agreement with the Texas

Commission on Environmental Quality. The Copano facility comprises 4,480 hectares (11,070 acres) of land, including 1,355 hectares (3,349 acres) of residue storage areas. Repurposing the residue storage areas, adjacent lands and related infrastructure continues to be our primary focus.

At several other locations around the world, we continued to monitor groundwater systems to assess natural attenuation of contaminant plumes. We provided periodic reports to governmental agencies on our progress toward eventual closeout.

Sustainable Land Use

For our large land holdings, some of which provide a buffer for our operations and others that contain mineral reserves that can be extracted over time, we seek and support sustainable uses.

Farming

We lease 6,032 hectares (14,905 acres) of our land at eight locations for farming. At our closed Frederick, Maryland (USA) location, for example, we have leased 434 hectares (1,072 acres) of land to the same family for more than 15 years for farming corn and other crops. Other farming operations produce apples, cherries, corn, hay and soybeans.

In Addy, Washington (USA), we grow alfalfa that the Washington Department of Fish and Wildlife harvests for the winter feeding of 7,000 elk and 200 bighorn sheep. We have grown and donated more than 900 metric tons of alfalfa annually since 2008.

Livestock

At our Warrick operations in Indiana and closed operations in Rockdale, Texas—both in the U.S.—independent farmers maintain herds of hundreds of cattle. At the Copano property, we own and maintain approximately 350 head of cattle. A small herd of cattle is also kept at our property in Blount County, Tennessee. At our Wagerup and Pinjarra refinery operations in Western Australia, our buffer lands are used by farmers to graze more than 6,000 head of cattle.

Mineral Mining

At some locations, we have other mineral resources in addition to the coal or smelter-quality bauxite for which the lands were obtained. We work with third-party consultants and miners to evaluate and sustainably mine these resources.

In Bauxite, Arkansas (USA), we have contracted with a company to mine hard rock for the construction and cement industries. Two other companies are mining bauxite resources primarily used to produce proppants for the hydraulic fracking process.

Water

At a number of locations, we hold significant water rights that benefit not only our operations but also the community. In Rockdale, we provide water to a public water company that supplies communities near this closed location. Where we have dams, we proactively work to manage water and reservoir levels to enable recreation and fishing.

Appendix

2019 Awards and Recognitions

Global

Dow Jones Sustainability World and North American Indices

Gold Supplier—EcoVadis

Bronze Class Sustainability Award 2019 and Industry Mover—RobecoSAM

Bloomberg Gender-Equality Index

Australia

Employer of Choice for Gender Equality (17th consecutive year)—Workplace Gender Equality Agency
Alcoa of Australia

Silver Tier Employer (sixth consecutive year for either silver or bronze tier)—Pride in Diversity, Australian Workplace Equality Index
Alcoa of Australia

Resources Sector Awards for Excellence (Enduring Partnership Award)—Department of Mines, Industry Regulation and Safety
Alcoa Harvey Waroona Sustainability Fund (partnership between Alcoa and Shires of Harvey and Waroona)

Volunteer Employer Recognition Awards (bronze category)—Department of Fire and Emergency Services
Huntly Bauxite Mine

Women in Resources Awards (Outstanding Company Initiative for Catalysts for Change)—Western Australian Chamber of Minerals and Energy
Alcoa of Australia

Women in Resources Awards (Diversity Champion)—Western Australian Chamber of Minerals and Energy
Michael Parker, then Chairman and Managing Director, Alcoa of Australia

Women in Resources National Awards (Gender Diversity Champion)—Australian Chambers of Minerals and Energy
Michael Parker, then Chairman and Managing Director, Alcoa of Australia

Brazil

One of the Most Sustainable Companies in Brazil (11th year)—Exame Magazine
Alcoa Brazil

Best Company to Work for (steel industry, employer brand and start a career categories)— Você S/A
Alcoa Brazil

Brazilian Mining-Metallurgical Industry Excellence Award—Revista Minérios & Minerales 2019
Juruti Mine

Female Leadership Award 2019 (new women leaders initiative category)—Brazilian Business Council for Sustainable Development
Poços de Caldas Operations

Waste Management Award— Benchmarking Brazil
Alumar Refinery, São Luís

Global Reporting Initiative Content Index

GRI 102 General Disclosures 2016

Disclosure	Description	Location
Organizational Profile		
102-1	Name of the organization	Alcoa Corporation
102-2	Activities, brands, products, and services	What We Do Value Creation Process Products Recycling
102-3	Location of headquarters	Pittsburgh, Pennsylvania, USA
102-4	Location of operations	Locations Corporate Overview
102-5	Ownership and legal form	Formed in 2016 under the laws of the State of Delaware, Alcoa Corporation is a publicly traded company listed on the New York Stock Exchange (NYSE: AA)
102-6	Markets served	What We Do
102-7	Scale of the organization	Annual Report Corporate Overview
102-8	Information on employees and other workers	Our People
102-9	Supply chain	Supply Chain
102-10	Significant changes to the organization and its supply chain	Annual Report Quarterly Reports Periodic Reports News Releases Supply Chain
102-11	Precautionary Principle or approach	Alcoa supports the precautionary principle. Consistent with that principle, we advocate a risk-based approach to our operations through our extensive management systems.
102-12	External initiatives	Reporting and Materiality
102-13	Membership of associations	Stakeholder and Community Engagement
Strategy		
102-14	Statement from senior decision-maker	From the CEO
Ethics and Integrity		
102-16	Values, principles, standards, and norms of behavior	Alcoa Values Human Rights Policy Code of Conduct Ethics and Compliance
102-17	Mechanisms for advice and concerns about ethics	Ethics and Compliance Integrity Line

GRI 102 General Disclosures 2016

Disclosure	Description	Location
Governance		
102-18	Governance structure	Board of Directors Board Committees
102-19	Delegating authority	Safety, Sustainability and Public Issues Committee Audit Committee
102-20	Executive-level responsibility for economic, environmental, and social topics	Alcoa's CEO, who reports to and is a member of the Board of Directors, has ultimate responsibility for economic, environmental and social topics. The chief financial officer is responsible for economic topics, and the vice presidents for environment, health and safety, sustainability and human resources have responsibility for environmental and social topics.
102-21	Consulting stakeholders on economic, environmental, and social topics	Safety, Sustainability and Public Issues Committee Stakeholder and Community Engagement
102-22	Composition of the highest governance body and its committees	Board of Directors Board Committees
102-23	Chair of the highest governance body	2020 Proxy Statement (page 19) The chairman of the board at the end of 2019 was Michael G. Morris.
102-24	Nominating and selecting the highest governance body	Governance and Nominating Committee 2020 Proxy Statement (page 16-28)
102-25	Conflicts of interest	Governance and Nominating Committee Corporate Governance Ethics and Compliance Annual Report (page 114) 2020 Proxy Statement (pages 32-33 and 37-38)
102-26	Role of highest governance body in setting purpose, values, and strategy	Board of Directors Officers
102-27	Collective knowledge of highest governance body	Board of Directors
102-28	Evaluating the highest governance body's performance	2020 Proxy Statement (page 32) The Board of Directors annually assesses the effectiveness of the full board, the operations of its committees and the contributions of directors.
102-29	Identifying and managing economic, environmental, and social impacts	Safety, Sustainability and Public Issues Committee Audit Committee Reporting and Materiality
102-30	Effectiveness of risk management processes	Risk Management 2020 Proxy Statement (page 36-37) Safety, Sustainability and Public Issues Committee Audit Committee
102-31	Review of economic, environmental, and social topics	Alcoa Corporation's Board of Directors and its committees review impacts, risks and opportunities at regularly scheduled board/committee meetings.
102-32	Highest governance body's role in sustainability reporting	Alcoa Corporation's Board of Directors does not have an active role in the report's development. Senior leaders are responsible for the report's content.

GRI 102 General Disclosures 2016

Disclosure	Description	Location
Governance		97
102-33	Communicating critical concerns	Stockholders and employees can communicate any concerns to Alcoa's Board of Directors through: • Regular mail, addressed to Chairman of the Board, c/o Alcoa Corporation, Corporate Secretary's Office, 201 Isabella Street, Suite 500, Pittsburgh, PA 15212-5858, USA; • Regular mail, addressed to Audit Committee, c/o Alcoa Corporation, Corporate Secretary's Office, 201 Isabella Street, Suite 500, Pittsburgh, PA 15212-5858, USA; • Integrity Line; • Stockholder resolutions; • Stockholder recommendations for director nominees; • Shareholder nominations from the floor of the annual meeting; and • Union representation or work councils.
102-34	Nature and total number of critical concerns	Stakeholder and Community Engagement
102-35	Remuneration policies	2020 Proxy Statement (pages 29-31 and pages 46-77)
102-36	Process for determining remuneration	2020 Proxy Statement (pages 29-31 and pages 46-77)
102-37	Stakeholders' involvement in remuneration	2020 Proxy Statement (pages 29-31 and pages 46-77)
102-38	Annual total compensation ratio	We report the global ratio only. 2020 Proxy Statement (page 76)
Stakeholder Engagement		
102-40	List of stakeholder groups	Stakeholder and Community Engagement
102-41	Collective bargaining agreements	Annual Report (page 15-16)
102-42	Identifying and selecting stakeholders	Stakeholder and Community Engagement
102-43	Approach to stakeholder engagement	Stakeholder and Community Engagement
102-44	Key topics and concerns raised	Stakeholder and Community Engagement Reporting and Materiality
Reporting Practice		
102-45	Entities included in the consolidated financial statements	Annual Report All entities included in the consolidated financial statements are included in the sustainability report. Page 58 explains the principles of consolidation, and page 120 includes a list of significant subsidiaries.
102-46	Defining report content and topic boundaries	Reporting and Materiality
102-47	List of material topics	Reporting and Materiality
102-48	Restatements of information	Found throughout the report.
102-49	Changes in reporting	Changes in reporting from prior year are indicated throughout the report
102-50	Reporting period	2019
102-51	Date of most recent report	2018
102-52	Reporting cycle	Annual
102-53	Contact point for questions regarding the report	Rosa Garcia Piñeiro Vice President, Sustainability www.alcoa.com/global/en/contact/default.asp

GRI 102 General Disclosures 2016

Disclosure	Description	Location
102-54	Claims of reporting in accordance with the GRI Standards	This report has been prepared in accordance with the GRI Standards: Core option.
102-55	GRI content index	Global Reporting Initiative Index
102-56	External assurance	Reporting and Materiality DNV GL Limited Assurance Report

Material Topics

GRI 201: Economic Performance 2016

201-1	Direct economic value generated and distributed	Shared Value Creation
201-2	Financial implications and other risks and opportunities due to climate change	Climate Protection
201-3	Defined benefit plan obligations and other retirement plans	Annual Report (pages 86-94)

GRI 302: Energy 2016

302-1	Energy consumption within the organization	Energy
302-2	Energy consumption outside of the organization	Energy
302-3	Energy intensity	Energy
302-4	Reduction of energy consumption	Energy
302-5	Reductions in energy requirements of products and services	Products Climate Protection Recycling

GRI 303: Water and Effluents 2018

303-3	303-3: Water withdrawal	Water
303-4	303-4: Water discharge	Water
303-5	303-5: Water consumption	Water

GRI 304: Biodiversity 2016

304-1	Operational sites owned, leased, managed in, or adjacent to, protected areas and areas of high biodiversity value outside protected areas	Biodiversity and Mine Rehabilitation
304-2	Significant impacts of activities, products, and services on biodiversity	Biodiversity and Mine Rehabilitation
304-3	Habitats protected or restored	Biodiversity and Mine Rehabilitation
304-4	IUCN Red List species and national conservation list species with habitats in areas affected by operations	Biodiversity and Mine Rehabilitation

GRI 305: Emissions 2016

305-1	Direct (Scope 1) GHG emissions	Climate Protection
305-2	Energy indirect (Scope 2) GHG emissions	Climate Protection
305-3	Other indirect (Scope 3) GHG emissions	Climate Protection
305-4	GHG emissions intensity	Climate Protection

Material Topics

Disclosure	Description	Location
GRI 305: Emissions 2016 *(continued)*		
305-5	Reduction of GHG emissions	Climate Protection Recycling
305-6	Emissions of ozone-depleting substances (ODS)	We use halon gas as a fire suppressant in several locations throughout the world, and we are phasing out these remaining systems as they expire or are used.
305-7	Nitrogen oxides (NOX), sulfur oxides (SOX), and other significant air emissions	Emissions
GRI 306: Effluents and Waste 2016		
306-2	Waste by type and disposal method	Waste and Spills Tailings Management
306-3	Significant spills	Waste and Spills
GRI 307: Environmental Compliance		
307-1	Non-compliance with environmental laws and regulations	Environmental Compliance
GRI 403: Occupational Health and Safety 2018		
403-1	Occupational health and safety management system	Safety and Health
403-2	Hazard identification, risk assessment, and incident investigation	Safety and Health
403-3	Occupational health services	Safety and Health
403-5	Worker training on occupational health and safety	Safety and Health
403-6	Promotion of worker health	Safety and Health
403-9	Work-related injuries	Safety and Health
403-10	Work-related ill health	Safety and Health
GRI 412: Human Rights Assessment 2016		
412-1	Operations that have been subject to human rights reviews or impact assessments	Human Rights
GRI 413: Local Communities 2016		
413-1	Operations with local community engagement, impact assessments and development programs	Stakeholder and Community Engagement

Mining and Metals Sector Supplement Disclosures

MM1	Amount of land (owned or leased, and managed for production activities or extractive use) disturbed or rehabilitated	Biodiversity and Mine Rehabilitation
MM2	The number and percentage of total sites identified as requiring biodiversity management plans according to stated criteria, and the number (percentage) of those sites with plans in place	Biodiversity and Mine Rehabilitation

Mining and Metals Sector Supplement Disclosures

Disclosure	Description	Location
MM3	Total amounts of overburden, rock, tailings, and sludges and their associated risks	Tailings Management Waste and Spills Biodiversity and Mine Rehabilitation
MM4	Number of strikes and lockouts exceeding one week's duration, by country	Two strikes in Europe and one lockout in Canada in 2019.
MM5	Total number of operations taking place in or adjacent to indigenous peoples' territories, and number and percentage of operations or sites where there are formal agreements with indigenous peoples' communities	Human Rights
MM6	Number and description of significant disputes relating to land use, customary rights of local communities and indigenous peoples	Stakeholder and Community Engagement
MM7	The extent to which grievance mechanisms were used to resolve disputes relating to land use, customary rights of local communities and indigenous peoples, and the outcomes.	Stakeholder and Community Engagement
MM8	Number (and percentage) of company operating sites where artisanal and small-scale mining takes place on, or adjacent to, the site; the associated risks and the actions taken to manage and mitigate these risks.	Due to the minimal artisanal and small-scale mining on Alcoa sites worldwide, there is not a formal corporate policy. Action is taken on a case-by-case basis.
MM9	Sites where resettlements took place, the number of households resettled in each, and how their livelihoods were affected in the process	No resettlements took place in 2019.
MM10	Number and percentage of operations with closure plan	Facility Stewardship and Transformation

Safety Performance

Data recordkeeping audits, injury classification reviews and other factors have resulted in changes to our safety data from prior reporting.

Fatalities
Employees/all contractors

	Global	Australia	Europe	North America	South America
2015	**2/1**	0/1	0	2/0	0
2016	**0/1**	0	0	0	0/1
2017	**0/3**	0	0/1	0	0/2
2018	**0**	0	0	0	0
2019	**0**	0	0	0	0

Fatalities by Gender
Employees and all contractors

	Male	Female	Total
2015	3	0	**3**
2016	1	0	**1**
2017	3	0	**3**
2018	0	0	**0**
2019	0	0	**0**

Fatal and Serious Injuries/Illnesses
Employees and all contractors

	FSI Actuals (Events resulting in a fatal or serious injury/illness)	FSI Potentials (Near-miss events)	Total FSI Events	Total FSI Rate
2015	5	698	**703**	**1.82**
2016	5	300	**305**	**1.08**
2017	5	433	**438**	**1.86**
2018	3	427	**430**	**1.84**
2019	3	339	**342**	**1.38**

A serious injury/illness is any incident that is life-threatening or life-altering. FSI rate is FSI actuals and potentials per 100 full-time workers.

Days Away, Restricted and Transfer Rate
Employees and all contractors

	Global	U.S. Manufacturing Average	Australia	Europe	North America	South America
2015	**0.33**	2.2	0.46	0.29	0.39	0.09
2016	**0.29**	2.1	0.49	0.16	0.26	0.21
2017	**0.62**	2.0	0.85	0.63	0.82	0.22
2018	**0.71**	2.0	0.96	0.64	1.03	0.27
2019	**0.86**		1.08	0.83	1.25	0.38

The 2019 Bureau of Labor Statistics U.S. manufacturing industry average was not available at the time this report was published. Days away, restricted and transfer rate includes lost workday cases plus cases that involve days of restricted duty and job transfer per 100 full-time workers.

Days Away, Restricted and Transfer Rate
Employees and supervised contractors

	Global	U.S. Manufacturing Average	Australia	Europe	North America	South America
2015	**0.39**	2.2	0.43	0.29	0.41	0.15
2016	**0.34**	2.1	0.63	0.21	0.26	0.11
2017	**0.92**	2.0	1.07	0.74	1.05	0.32
2018	**1.01**	2.0	1.16	0.79	1.23	0.18
2019	**1.21**		1.19	0.92	1.52	0.64

The 2019 Bureau of Labor Statistics U.S. manufacturing industry average was not available at the time this report was published. Days away, restricted and transfer rate includes lost workday cases plus cases that involve days of restricted duty and job transfer per 100 full-time workers.

Days Away, Restricted and Transfer Incidents by Gender
Employees and supervised contractors

	Male	Female	Total
2015	72	2	**74**
2016	51	2	**53**
2017	121	10	**131**
2018	127	17	**144**
2019	157	12	**169**

Days Away, Restricted and Transfer Rate
Non-supervised contractors

	Global	Australia	Europe	North America	South America
2015	**0.21**	0.54	0.30	0.33	0.06
2016	**0.20**	0.07	0.00	0.26	0.24
2017	**0.20**	0.30	0.34	0.10	0.19
2018	**0.34**	0.51	0.29	0.35	0.30
2019	**0.42**	0.81	0.60	0.31	0.32

Because contractors not directly supervised by Alcoa maintain their own health and safety programs and are accountable for investigating incidents involving their employees, certain details associated with their internal investigations are not fully transparent to Alcoa.

Days Away, Restricted and Transfer Incidents by Gender
Non-supervised contractors

	Male	Female	Total
2015	20	1	**21**
2016	16	1	**17**
2017	19	1	**20**
2018	35	4	**39**
2019	44	3	**47**

Lost Workday Rate
Employees and all contractors

	Global	U.S. Manufacturing Average	Australia	Europe	North America	South America
2015	**0.12**	1.0	0.23	0.07	0.13	0.04
2016	**0.15**	0.9	0.31	0.08	0.11	0.11
2017	**0.25**	0.9	0.49	0.12	0.20	0.16
2018	**0.22**	0.9	0.41	0.09	0.24	0.11
2019	**0.22**		0.38	0.27	0.08	0.20

The 2019 Bureau of Labor Statistics U.S. manufacturing industry average was not available at the time this report was published. Lost workday rate represents the number of injuries and illnesses resulting in one or more days away from work per 100 full-time workers.

Lost Workday Rate
Employees and supervised contractors

	Global	U.S. Manufacturing Average	Australia	Europe	North America	South America
2015	**0.14**	1.0	0.25	0.03	0.11	0.12
2016	**0.19**	0.9	0.40	0.10	0.12	0.11
2017	**0.32**	0.9	0.59	0.12	0.25	0.19
2018	**0.29**	0.9	0.49	0.13	0.26	0.12
2019	**0.25**		0.43	0.18	0.07	0.46

The 2019 Bureau of Labor Statistics U.S. manufacturing industry average was not available at the time this report was published. Lost workday rate represents the number of injuries and illnesses resulting in one or more days away from work per 100 full-time workers.

Lost Workday Incidents by Gender
Employees and supervised contractors

	Male	Female	Total
2015	26	0	**26**
2016	29	1	**30**
2017	42	4	**46**
2018	40	1	**41**
2019	34	1	**35**

Lost Workday Rate
Non-supervised contractors

	Global	Australia	Europe	North America	South America
2015	**0.09**	0.19	0.19	0.22	0.00
2016	**0.08**	0.07	0.00	0.06	0.11
2017	**0.14**	0.24	0.11	0.05	0.15
2018	**0.13**	0.26	0.00	0.17	0.10
2019	**0.18**	0.27	0.48	0.12	0.13

Because contractors not directly supervised by Alcoa maintain their own health and safety programs and are accountable for investigating incidents involving their employees, certain details associated with their internal investigations are not fully transparent to Alcoa.

Lost Workday Incidents by Gender
Non-supervised contractors

	Male	Female	Total
2015	9	0	**9**
2016	6	1	**7**
2017	13	1	**14**
2018	13	2	**15**
2019	18	2	**20**

Total Recordable Incident Rate
Employees and all contractors

	Global	U.S. Manufacturing Average	Australia	Europe	North America	South America
2015	**1.11**	3.8	1.33	0.80	1.61	0.36
2016	**1.10**	3.6	1.43	0.81	1.38	0.46
2017	**1.57**	3.5	1.96	1.36	2.37	0.45
2018	**1.66**	3.4	2.38	1.45	2.41	0.55
2019	**1.81**		2.19	1.50	3.09	0.58

The 2019 Bureau of Labor Statistics U.S. manufacturing industry average was not available at the time this report was published. Total recordable incident rate includes days away, restricted and transfer cases plus cases that involve days of medical treatment or other recordables per 100 full-time workers.

Total Recordable Incident Rate
Employees and supervised contractors

	Global	U.S. Manufacturing Average	Australia	Europe	North America	South America
2015	**1.35**	3.8	1.26	0.80	1.83	0.34
2016	**1.39**	3.6	1.61	0.99	1.54	0.46
2017	**2.26**	3.5	2.23	1.57	3.01	0.64
2018	**2.33**	3.4	2.69	1.87	2.81	0.43
2019	**2.58**		2.39	1.52	3.74	0.70

The 2019 Bureau of Labor Statistics U.S. manufacturing industry average was not available at the time this report was published. Total recordable incident rate includes days away, restricted and transfer cases plus cases that involve days of medical treatment or other recordables per 100 full-time workers.

Total Recordable Incident Rate
Non-supervised contractors

	Global	Australia	Europe	North America	South America
2015	**0.66**	1.51	0.81	0.65	0.36
2016	**0.58**	0.90	0.23	0.71	0.46
2017	**0.59**	1.30	0.79	0.45	0.39
2018	**0.83**	1.69	0.48	1.04	0.58
2019	**0.86**	1.72	1.45	0.86	0.55

Because contractors not directly supervised by Alcoa maintain their own health and safety programs and are accountable for investigating incidents involving their employees, certain details associated with their internal investigations are not fully transparent to Alcoa.

Total Recordable Incidents by Gender
Employees and supervised contractors

	Male	Female	Total
2015	246	12	**258**
2016	198	20	**218**
2016	292	30	**322**
2018	293	40	**333**
2019	332	28	**360**

Total Recordable Incidents by Gender
Non-supervised contractors

	Male	Female	Total
2015	62	4	**66**
2016	47	2	**49**
2016	55	4	**59**
2018	88	7	**95**
2019	92	4	**96**

Independent Limited Assurance Report

to the Directors of Alcoa Corporation

Alcoa Corporation ("Alcoa") commissioned DNV GL Business Assurance Services UK Limited ("DNV GL", "us" or "we") to conduct a limited assurance engagement over Selected Information presented in the 2019 Alcoa Sustainability Report (the "Report") for the reporting year ended 31st December 2019.

Our Conclusion: Based on the procedures we have performed and the evidence we have obtained, nothing has come to our attention that causes us to believe that the Selected Information is not fairly stated and has not been prepared, in all material respects, in accordance with the Criteria.
This conclusion relates only to the Selected Information, and is to be read in the context of this Assurance Report, in particular the inherent limitations explained below.

Selected information

The scope and boundary of our work is restricted to the key performance indicators included within the Report (the "Selected Information"), listed below:

- Direct (Scope 1) GHG emissions: 17.7 million metric tons of CO_2e
- Indirect (Scope 2 location based) GHG emissions: 6.6 million metric tons of CO_2e
- Other indirect (Scope 3) GHG emissions (categories 1, 3, 4, 5, 6, 9 and 10): 39.6 million metric tons of CO_2e
- Energy Consumption: 183,258 thousands of gigajoules; 39,618 thousands of megawatt hours
- Number of fatalities: 0
- Number of events resulting in Fatal or Serious Injury/Illness (FSI Actuals): 3
- Number of incidents resulting in Days Away, Restricted or Transfer (DART) (Employees and supervised contractors): 169
- Number of incidents resulting in Days Away, Restricted or Transfer (DART) (Non-supervised contractors): 47
- Number of Lost Workdays incidents (LWD) (Employees and supervised contractors): 35
- Number of Lost Workdays incidents (LWD) (Non-supervised contractors): 20
- Water withdrawal in all locations: 809 million cubic meters
- Water withdrawal in Alcoa-defined water stressed areas: 43.1 million cubic meters
- Landfilled waste: 226.1 thousands of metric tons

To assess the Selected Information, which includes an assessment of the risk of material misstatement in the Report, we have used Alcoa's Basis of Reporting (the "Criteria"), which can be found within the appropriate sections for Climate Protection, Energy, Safety and Health, Water and Waste of the 2019 Alcoa Sustainability Report.

We have not performed any work, and do not express any conclusion, on any other information that may be published in the Report or on Alcoa's website for the current reporting period or for previous periods.

Standard and level of assurance

We performed a **limited** assurance engagement in accordance with the International Standard on Assurance Engagements (ISAE) 3000 revised – 'Assurance Engagements other than Audits and Reviews of Historical Financial Information' (revised), issued by the International Auditing and Assurance Standards Board. This standard requires that we comply with ethical requirements and plan and perform the assurance engagement to obtain limited assurance.

Our competence, independence and quality control

DNV GL established policies and procedures are designed to ensure that DNV GL, its personnel and, where applicable, others are subject to independence requirements (including personnel of other entities of DNV GL) and maintain independence where required by relevant ethical requirements. This engagement work was carried out by an independent team of sustainability assurance professionals. DNV GL holds other audit and assurance contracts with Alcoa, none of which conflict with the scope of this work. Our multi-disciplinary team consisted of professionals with a combination of environmental and sustainability assurance experience.

Inherent limitations

All assurance engagements are subject to inherent limitations as selective testing (sampling) may not detect errors, fraud or other irregularities. Non-financial data may be subject to greater inherent uncertainty than financial data, given the nature and methods used for calculating, estimating and determining such data. The selection of different, but acceptable, measurement techniques may result in different quantifications between different entities. Our assurance relies on the premise that the data and information provided to us by Alcoa have been provided in good faith. DNV GL expressly disclaims any liability or co-responsibility for any decision a person or an entity may make based on this Independent Limited Assurance Report.

DNV GL applies its own management standards and compliance policies for quality control, in accordance with ISO/IEC 17021:2011 - Conformity Assessment Requirements for bodies providing audit and certification of management systems, and accordingly maintains a comprehensive system of quality control including documented policies and procedures regarding compliance with ethical requirements, professional standards and applicable legal and regulatory requirements.

The procedures performed in a limited assurance engagement vary in nature and timing from, and are less in extent than for, a reasonable assurance engagement; and the level of assurance obtained is substantially lower than the assurance that would have been obtained had a reasonable assurance engagement been performed. We planned and performed our work to obtain the evidence we considered sufficient to provide a basis for our opinion, so that the risk of this conclusion being in error is reduced but not reduced to very low.

Basis of our conclusion

We are required to plan and perform our work in order to consider the risk of material misstatement of the Selected Information; our work included, but was not restricted to:

- Assessing the appropriateness of the Criteria for the Selected Information;
- Conducting interviews with Alcoa's management to obtain an understanding of the key processes, systems and controls in place to generate, aggregate and report the Selected Information;
- Physical site visit to the Deschambault (Canada) smelter to review processes and systems for preparing site level data consolidated at group level;
- Remote site visit to the San Ciprian (Spain) refinery and smelter to review processes and systems for preparing site level data consolidated at group level. This was originally planned to be a physical site visit and was completed remotely due to travel restrictions put in place to manage COVID-19;
- Sites were selected on the basis of their materiality to overall group data and we were free to select sites visited;
- Testing of consolidation of data at Head Office was planned to be in person, and instead it was completed remotely due to travel restrictions put in place to manage COVID-19;
- Performing limited testing on a sampled basis of the Selected Information to check that data had been appropriately measured, recorded, collated and reported;
- Reviewing that the evidence, measurements and their scope provided to us by Alcoa for the Selected Information is prepared in line with the Criteria; and
- Reading the Report and narrative accompanying the Selected Information within it with regard to the Criteria.

Responsibilities of the Directors of Alcoa and DNV GL

The Directors of Alcoa have sole responsibility for:

- Preparing and presenting the Selected information in accordance with the Criteria;
- Designing, implementing and maintaining effective internal controls over the information and data, resulting in the preparation of the Selected Information that is free from material misstatements;
- Measuring and reporting the Selected Information based on their established Criteria; and
- Contents and statements contained within the Report and the Criteria.

Our responsibility is to plan and perform our work to obtain limited assurance about whether the Selected Information has been prepared in accordance with the Criteria and to report to Alcoa in the form of an independent limited assurance conclusion, based on the work performed and the evidence obtained. We have not been responsible for the preparation of the Report.

DNV GL Business Assurance

DNV GL Business Assurance Services UK Limited is part of DNV GL – Business Assurance, a global provider of certification, verification, assessment and training services, helping customers to build sustainable business performance. www.dnvgl.co.uk/BetterAssurance

DNV GL Business Assurance Services UK Limited

London, UK
1st May 2020

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