



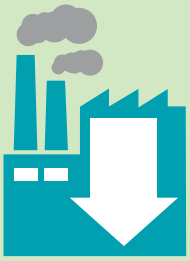
2016

Alcoa Sustainability Report



Alcoa

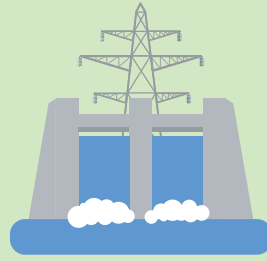
Alcoa Sustainability Performance 2016



19% reduction in carbon dioxide equivalent emissions



1% decline in energy intensity



71% of purchased electricity came from renewable sources



14% decline in area disturbed for mining

38% reduction in landfilled waste



4% improvement in bauxite residue storage efficiency



405,513 metric tons of scrap recycled

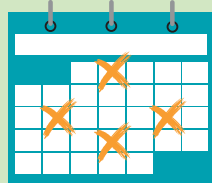
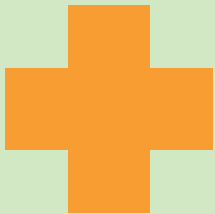
2% decline in freshwater-use intensity



2 products launched in the Sustana™ line—ECOLUM™ cast products and ECODURA™ billet



1 fatality



21% decline in days away, restricted and transfer rate

21% increase in lost workday rate



US\$7.8 billion in purchased goods and services

US\$6.3 million in community investments*



9,200 employee volunteer hours in the community*

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Forward-looking Statements

Certain statements in this document by Alcoa 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,” “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, including, without limitation, forecasts concerning global demand growth for aluminum and supply/demand balances, including customer end markets; statements regarding targeted financial results or operating performance; and statements about Alcoa’s strategies, outlook, business and financial prospects. Forward-looking statements are not guarantees of future performance and are subject to risks, uncertainties and changes in circumstances that are difficult to predict. Although Alcoa believes that the 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.

Such risks and uncertainties include, but are not limited to: (a) material adverse changes in aluminum industry conditions; (b) deterioration in global economic and financial market conditions generally; (c) unfavorable changes in the markets served by Alcoa; (d) the impact of changes in foreign currency exchange rates on costs and results; (e) increases in energy costs; (f) the inability to achieve the level of revenue growth, cash generation, cost savings, improvement in profitability and margins, fiscal discipline or strengthening of competitiveness and operations (including moving its alumina refining and aluminum smelting businesses down on the industry cost curves) anticipated from restructuring programs and productivity improvement, cash sustainability, technology advancements and other initiatives; (g) Alcoa’s inability to realize expected benefits, in each case as planned and by targeted completion dates, from acquisitions, divestitures, facility closures, curtailments or expansions, or international joint ventures; (h) political, economic and regulatory risks in the countries in which Alcoa operates or sells products; (i) the outcome of contingencies, including legal proceedings, government or regulatory investigations and environmental remediation; (j) the impact of cyber attacks and potential information technology or data security breaches; and (k) the other risk factors discussed in Alcoa’s [Form 10-K](#) for the year ended December 31, 2016, and other reports filed with the U.S. Securities and Exchange Commission. 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. Market projections are subject to the risks discussed above and other risks in the market.

From the CEO

Dear Alcoa Stakeholders:

With this first sustainability report as Alcoa Corporation, we remain committed to being a leader in our industry for a more sustainable, transparent future. We will reduce the impacts from our operations while increasing the value we bring to society. Most important, we will always operate in alignment with our Values to act with integrity, operate with excellence and care for people.

We have a simplified approach to sustainability that is focused on our fundamental challenges and opportunities. Through that approach, we achieved the following during 2016:

- Introduced the SUSTANA™ line of aluminum products, which we produce with low carbon emissions and recycled aluminum content;
- Reduced both greenhouse gas emissions and energy consumption by 19 percent;
- Used 23 percent less freshwater and achieved a 2 percent decline in freshwater-use intensity;
- Eliminated 86,500 metric tons of landfilled waste;
- Achieved a 21 percent decline in our days away, restricted and transfer (DART) safety rate;
- Transformed and modernized our approach to talent management to empower our people to make Alcoa better every day;
- Tied our annual variable compensation to achieving significant aspects of our strategic sustainability targets; and
- Launched an initiative to review and monitor the compliance programs of significant joint ventures where we are not the controlling shareholder.



Overshadowing all of these accomplishments is a contractor who did not make it home to his family after suffering a fatal injury at our Alumar location in Brazil. We cannot and will not stop until we eliminate all fatalities from our operations, and we have refocused our safety approach to better prevent and mitigate fatalities and serious injuries and illnesses. Details can be found in the [Safety](#) section.

Sustainability is a journey. Although we are a new company, we have significant experience, leadership and accomplishments to draw upon as we forge our new path.

We [welcome your input](#) on this report and our sustainability performance.

A handwritten signature in black ink, appearing to read 'Roy C. Harvey'.

Roy C. Harvey
Chief Executive Officer

The background consists of several overlapping geometric shapes. A large, dark blue triangle is on the left side, pointing towards the bottom right. A medium blue triangle is on the right side, pointing towards the top right. A white triangle is at the bottom right, pointing towards the top right. The text 'Sustainability at Alcoa' is centered in the white area.

Sustainability at Alcoa

Sustainability Approach

Throughout the world, sustainability drives us to minimize our impacts and maximize our value.

Our approach is rooted in the strong sustainability vision of our former parent company, Alcoa Inc., which made a public commitment to society in the 1950s with the formation of Legacy Alcoa Foundation and to the environment in the 1990s through setting, achieving and reporting on ambitious goals. In recognition, the company was named to the Dow Jones Sustainability Indices each year since their launch in 1999.

This is our heritage. It has earned us the credibility and trust to mine bauxite in two of the most protected areas on the planet—the Brazilian Amazon and the jarrah forest in Western Australia. It guides us as we operate in countries with weak or differing rules of law. It keeps us in good standing with governments and communities to ensure access to competitive, long-term energy contracts.

“While aluminum is a resource-intensive product, it plays an important role in providing building blocks necessary for economic development. WRI is especially interested in collaborating with companies striving to meet societal needs while staying within the science-based ecological limits of our planet. Partnerships such as the one between WRI and Alcoa seek to scale positive change and build a more sustainable tomorrow, tackling issues from climate change to renewable energy to the restoration of degraded lands.”



JP Leous
Senior Manager,
Corporate Relations
World Resources Institute

Building on this foundation, our current sustainability approach will deliver value through the following three pillars:

- Creating sustainable value for the communities where we operate;

- Enhancing the value of our products to overcome society's challenges; and
- Reducing and measuring our environmental impacts to improve the footprint of our operations.

We will continue setting long-term sustainability targets for these three pillars and publicly reporting on our progress. (See the [Sustainability Targets](#) section.) In addition, we will consider certifying our value chain against the sustainability standards currently being developed by the [Aluminum Stewardship Initiative](#), of which we are a member.

Creating Sustainable Value

We actively participate in every community in which we operate around the world. We want these communities to thrive, and we view our presence as an opportunity to help develop economic activity, environmental practices and social programs that will stay in place after our role ends.

[Alcoa Foundation](#) focuses its investments on promoting the prevention of, and resilience to, climate change from human activity, as well as the restoration and preservation of biodiversity. Each location also uses the Alcoa Community Framework to engage with stakeholders to identify local opportunities for value creation. (See the [Stakeholder Engagement](#) section.)

A good example of delivering shared value is our Juruti mine in the heart of the Brazilian Amazon. In partnership with local stakeholders, we developed a three-pronged approach to improve the economic, environmental and social aspects of this geographically isolated region.

The Sustainable Juruti Council brings together representatives from the private sector, government and civil society to guide and manage the overall sustainability agenda of the Juruti region. The Sustainable Juruti Fund allocates resources to be invested in sustainable initiatives proposed by the community. The council uses community-developed sustainability indicators to monitor local development.

When Alcoa entered this region of almost 35,000 people living in mainly rural communities, the average per capita income was US\$23 per month, the illiteracy rate was 21 percent and the [Human Development Index](#) (HDI) was 0.389. The economy was based on fishing, cattle-raising, Brazilian nut extraction and subsistence agriculture. There was minimal

health care, with many residents traveling up to 12 hours by boat to get needed medical attention. Educational, governmental and transportation infrastructure was non-existent or in need of extensive repair.

A decade later, the region has high-paying mining jobs, a thriving service industry, a community hospital, additional classrooms and elementary school, paved roads, a courthouse, government offices, deep water wells to provide freshwater, a cultural center and more. Per capita income has more than doubled, the illiteracy rate is 9.75 percent and the HDI is 0.592.

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 and emissions compared to virgin aluminum.

In late 2016, we introduced our SUSTANA line of aluminum products, which is produced with low carbon emissions and recycled content. This platform will allow us to position and differentiate our innovative, value-added products moving forward to capture other market opportunities and create additional value. (See the [Products](#) section.)

Improving Our Footprint

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

Ambitious 2020 and 2030 targets for [emissions](#), [energy](#), [waste](#) and [water](#), created by Alcoa Inc., guided our footprint-reducing efforts in 2016. Our approach and performance for each can be found in the individual sections within this report. We will review these goals in 2017.

We also serve as stewards of the land, operating in a manner that focuses on minimizing our 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 management and support our license to operate. (See the [Land Management](#) section.)

Related Information

[Strategic Sustainability Targets Opportunities and Challenges](#)

Strategic Sustainability Targets

Our sustainability approach is driven by—and measured against—our strategic sustainability targets. These long-term goals help us seamlessly integrate sustainability into our business processes to help us minimize our impacts and maximize our value.

Throughout this report, we provide updates on our performance against applicable targets that we carried forward from Alcoa Inc. During 2017, we will review and, when necessary, update our targets to ensure that we are focused on the material issues of the new company and providing appropriate stretch goals to address them.

Carbon Dioxide Equivalent Emissions Intensity	Landfilled Waste	Fatalities
<ul style="list-style-type: none"> • Baseline: 2005 • Target 2020: 30% reduction • Target 2030: 35% reduction • Performance 2016: 36.9% 	<ul style="list-style-type: none"> • Baseline: 2005 • Target 2020: 75% reduction • Target 2030: 100% reduction • Performance 2016: 50.6% 	<ul style="list-style-type: none"> • Target: Zero fatalities • Performance 2016: One contractor fatality
Energy Intensity	Bauxite Residue Storage Area Rehabilitation	Women/Minority Representation at Executive Level
<ul style="list-style-type: none"> • Baseline: 2005 • Target 2020: 10% reduction • Target 2030: 15% reduction • Performance 2016: 4.6% 	<ul style="list-style-type: none"> • Baseline: 2005 • Target 2020: 30% rehabilitated • Target 2030: 40% rehabilitated • Performance 2016: 18% 	<ul style="list-style-type: none"> • Global women target: 20.9% • U.S. minorities target: 23.4% • 2016 global women: 20.9% • 2016 U.S. minorities: 24.3%
Freshwater-use Intensity	Recycle/Reuse Bauxite Residue Generated	Employees Volunteering in the Community
<ul style="list-style-type: none"> • Baseline: 2005 • Target 2020: 25% reduction • Target 2030: 30% reduction • Performance 2016: 8.1% 	<ul style="list-style-type: none"> • Target 2020: 15% • Target 2030: 30% • Performance 2016: 0 	<ul style="list-style-type: none"> • Target: 40% volunteer through community service projects sponsored by Alcoa • Performance 2016: 18.4%

Related Information

[Sustainability Approach](#)

Value Creation Process

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

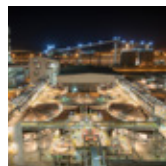
The following simplified analysis of our value creation process identifies our key inputs, outputs and effects on stakeholders. We used this analysis to help determine our [material topics](#).

General Aspects Applicable to All Processes



Key Inputs

- Financial resources
- Labor
- Technology
- Knowledge and skills
- Training
- Environment, health and safety culture
- Stakeholder and community engagement
- Impact assessment
- Regulatory process
- Strong governance



Key Outputs

- Salaries
- Taxes
- Stockholder value
- Job creation and stable job base
- Skilled employees
- Environmental footprint
- Information to stakeholders



Key Effects

Communities

- Income stability for families
- Professional development
- Local enterprise development
- Local institutional investment
- Improved quality of life
- Improved security
- Environmental impacts
- Flow-on job creation and economic benefits

Company

- Increased reputation
- Right to grow
- Increased productivity

Customers

- Transparency along supply chain
- Reduced supply chain risk

Stockholders

- Higher value

Bauxite Mining — 85% internal consumption, 15% third-party shipments



Key Inputs

- Bauxite reserves
- Land surface
- Infrastructure
- Water
- Energy (fuels)



Key Outputs

- Bauxite
- Royalties
- Wastewater
- Air emissions
- Noise
- Rehabilitated land



Key Effects

- Potential community relocation
- Biodiversity disturbance
- Changes to landscape

Alumina Refining — 35% internal consumption, 65% third-party shipments



Key Inputs

- Bauxite
- Water
- Lime
- Caustic soda
- Energy (electricity, natural gas and fuels)



Key Outputs

- Smelter grade and non-metallurgical alumina
- Bauxite residue
- Greenhouse gas emissions
- Other air emissions
- Noise



Key Effects

- Export revenue generation
- Changes to landscape
- Environmental disturbances
- Business development through the sale of coproducts and byproducts
- Research and development opportunities

Aluminum Smelting — 100% internal consumption



Key Inputs

- Alumina
- Energy (primarily electricity)
- Aluminum fluoride
- Coke
- Pitch



Key Outputs

- Molten aluminum
- Greenhouse gas emissions
- Fluoride emissions
- Other air emissions
- Spent pot lining



Key Effects

- Changes to landscape
- Potential effects on local vegetation
- Contribution to climate change
- Development of recycling industry
- Business development through the sale of coproducts and byproducts

Aluminum Casting — 5% internal consumption, 95% third-party shipments



Key Inputs

- Molten metal
- Aluminum scrap
- Alloying elements
- Fluxing agents
- Energy (fossil fuels and electricity)
- Refractory materials
- Water



Key Outputs

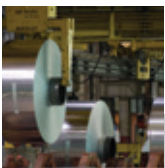
- Aluminum primary products
- Aluminum dross
- Emissions from combustion



Key Effects

- Alloy development for lighter, stronger and longer-lasting products.
- Greenhouse gas emissions reduction through product life cycle
- Partnerships with customers for research and development investments
- Increased aluminum recycling

Aluminum Rolling — 100% third-party shipments



Key Inputs

- Primary aluminum
- Aluminum scrap
- Alloying elements
- Oils and lubricants
- Energy (electricity, natural gas and fuels)
- Packaging material
- Coatings



Key Outputs

- Flat-rolled products for packaging industry
- Lithographic sheet
- Industrial sheet
- Volatile organic compounds
- Oil waste



Key Effects

- Lighter and fully recyclable packaging material
- Extended food preservation time and reduced food waste
- Increased packaging end-of-life recycling

Energy Generation — 15% internal consumption, 85% third-party watt hours



Key Inputs

- Water
- Coal
- Land surface
- Distribution infrastructure



Key Outputs

- Electricity
- Water dam
- Carbon dioxide emissions
- Sulfur dioxide emissions
- Nitrogen oxide emissions
- Fly ash waste
- Rehabilitated land



Key Effects

- Changes to landscape
- Contribution to climate change
- Land disturbance
- Biodiversity impacts
- Decoupling from energy market volatility (reduced risk)

Data are approximate. As of 2017, Alcoa's three business units are Alcoa Bauxite, Alcoa Alumina and Alcoa Aluminum. The latter includes aluminum smelting, aluminum casting, aluminum rolling and a majority of energy generation.

Opportunities and Challenges

Inherently lightweight, durable and infinitely recyclable, aluminum is well-positioned to capture opportunities that address climate change, urbanization and other global megatrends.

The challenge is doing so without negating the positive impact, as aluminum production is energy- and resource-intensive and a major emitter of greenhouse gases.

Opportunities: We have significant opportunities to grow our business and further embed sustainability within our operations and those of our business partners.

Growth in Aluminum Demand

- With an annual growth rate of 5 percent in 2016 and a similar rate projected for 2017, global demand for aluminum continues to increase at one of the highest rates among base metals.
- Stricter emissions and fuel-efficiency regulations and consumer demand for more sustainable products have positioned aluminum as a metal of choice to reduce weight and increase recyclability without compromising performance.
- We are well-positioned to capitalize on this growth. We are a recognized sustainability leader within our industry, and this reputation facilitates access to additional resources we require to grow. Our operations are strategically located near the world's growth markets, and we continue to move down the cost curves for alumina and aluminum.

Product and Process Differentiation

- We have opportunities to differentiate our products from the competition by leveraging key attributes that are important to our customers. For example, our new SUSTANA line of aluminum products improves the carbon impact of our customers' supply chains, helping them achieve their sustainability goals.
- On the production side, we have opportunities to reduce our environmental footprint through process improvements and advanced technologies. We also have taken a leadership position in transforming coproducts and byproducts from our operations into commercially viable products. (See the [Waste and Emissions](#) section).

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.
- In 2016, we implemented an initiative to review and monitor the compliance programs of significant joint ventures where we are not the controlling shareholder. 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 partner 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 best practices.

Challenges: While capturing the opportunities, we must address the challenges.

Aluminum Pricing

- A persistent challenge is fluctuation in the price of aluminum due to factors beyond our control. Pricing can be impacted by macroeconomic developments that suppress demand, such as an economic slowdown that would negatively impact the construction or automotive industry.
- Pricing also can be influenced by excess supply on the global market. For example, China increased its exports in recent years as production capacity exceeded domestic demand.
- China produces more than half of the world's primary aluminum, with 90 percent of this production powered by electricity produced at coal-fired plants. It is estimated that the country emits more than 65 percent of the world's greenhouse gas emissions for aluminum production.

Exposure to Carbon Markets

- The industry's heavy carbon footprint and the signing of the [2016 Paris Agreement](#) on climate change have increased interest 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. We have been participating in the carbon markets in Europe and Canada and will draw from this experience as other initiatives are introduced around the world.

Increased Regulatory and Social Scrutiny

- In November 2015, a mining company's residue storage area in Brazil collapsed. The resulting disaster escalated regulatory scrutiny of the country's mining industry as a whole and raised concerns among various stakeholders. We are confident that our operations in Brazil and every country meet the highest standards for safety and are deserving of the license to operate.
- Unauthorized bauxite mining in Malaysia by other operators is also increasing scrutiny of the industry. Small-scale firms using sub-standard mining practices in that country have damaged the land, waterways and air, as well as local food supplies.

Operational Challenges

- Challenges we face within our own operations include:
 - Eliminating employee and contractor fatalities and mitigating risks of injuries inherent 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 byproducts 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;
 - Integrating our sustainability platform 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.

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 in accordance with the International Organization for Standardization's ISO 31000 (risk management).

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 business 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 risk areas and presented to management to determine how they should be prioritized. Our process is multi-dimensional and focuses on several aspects, including likelihood of occurrence, level of impact and mitigating risk factors. Each is considered in assessing and prioritizing risk, with more emphasis placed on likelihood and impact.

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.

A discussion of our significant risks can be found in our [Form 10-K](#) for the year ended December 31, 2016. Additional risks and uncertainties not presently known to us or that we currently deem immaterial also may materially adversely affect us in future periods.

Any forecast set forth in this section speaks as of the date it was originally presented. 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.

Reporting and Materiality

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

For this inaugural Alcoa Corporation sustainability report, we based the content primarily on the requirements of the [Global Reporting Initiative's GRI Standards](#) and the expectations of our stakeholders. The information covers all global operations where we have financial and/or operational control, unless otherwise noted.

During 2017, we will revisit our process to solicit stakeholder input on our report content and material topics. We relied upon the following for this report:

- Outcomes of stakeholder engagement at the location level using the Alcoa Community Framework and community advisory boards;
- Key issues identified by industry organizations;
- Ongoing engagement with governmental and non-governmental organizations (NGOs);
- Internal sustainability goals and priorities;
- Analysis of our value creation process;
- Issues evaluated by leading sustainability ranking organizations, such as the [Dow Jones Sustainability Indices](#) and [CDP](#);
- Customer feedback and sustainability questionnaires;
- Regulatory developments and trends in the various regions where we operate;
- Media coverage;
- External standards and initiatives that we follow or endorse, including the [Aluminum Stewardship Initiative](#), [United Nations Global Compact](#), [Business Roundtable Principles of Corporate Governance](#), [International Organization for Standardization](#) and [International Aluminium Institute Sustainability Principles](#); and
- Alcoa business strategy and leadership insight.

Using this input, we identified the following as our 2016 material topics.

Material Topics	
Material Topic	Boundary
Economic Performance	Stockholders, lenders, financial analysts, investors globally and communities surrounding our operating locations
Greenhouse Gas Emissions	Government agencies, NGOs and communities surrounding our operating locations
Energy	Government agencies, NGOs and communities surrounding our operating locations.
Water	Government agencies, NGOs and communities surrounding our operating locations, especially those in water-stressed regions of the world
Effluents and Waste	Government agencies, NGOs and communities surrounding our operating locations
Biodiversity	Government agencies, NGOs and communities surrounding our operating locations
Health and Safety	Government agencies focused on health and safety in each country in which we operate and communities surrounding our operating locations
Local Communities	Communities surrounding our operating locations and NGOs

Assurance

[First Environment](#) provided limited assurance on our total 2016 Scope 1 and Scope 2 greenhouse gas emissions data (under the ISO 14064, Part 3: Specification with guidance for the validation and verification of greenhouse gas assertions) and verified the accuracy of the energy data used as a basis for the calculation of these emissions. The company also provided limited assurance on our Scope 3 emissions for six of the 15 categories—purchased goods and services; fuels and energy related activities; waste generated in operations; business travel; employee commuting; and downstream transportation and distribution. ([View the limited assurance verification statement.](#))

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

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Enhancing Product Value

Products

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 reduce greenhouse gas emissions over the life cycle.. It enables lighter, fully recyclable packaging that preserves food longer, reducing waste.

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

We currently hold Bronze [Cradle to Cradle Certification](#) for our primary aluminum, can sheet and bottle stock.

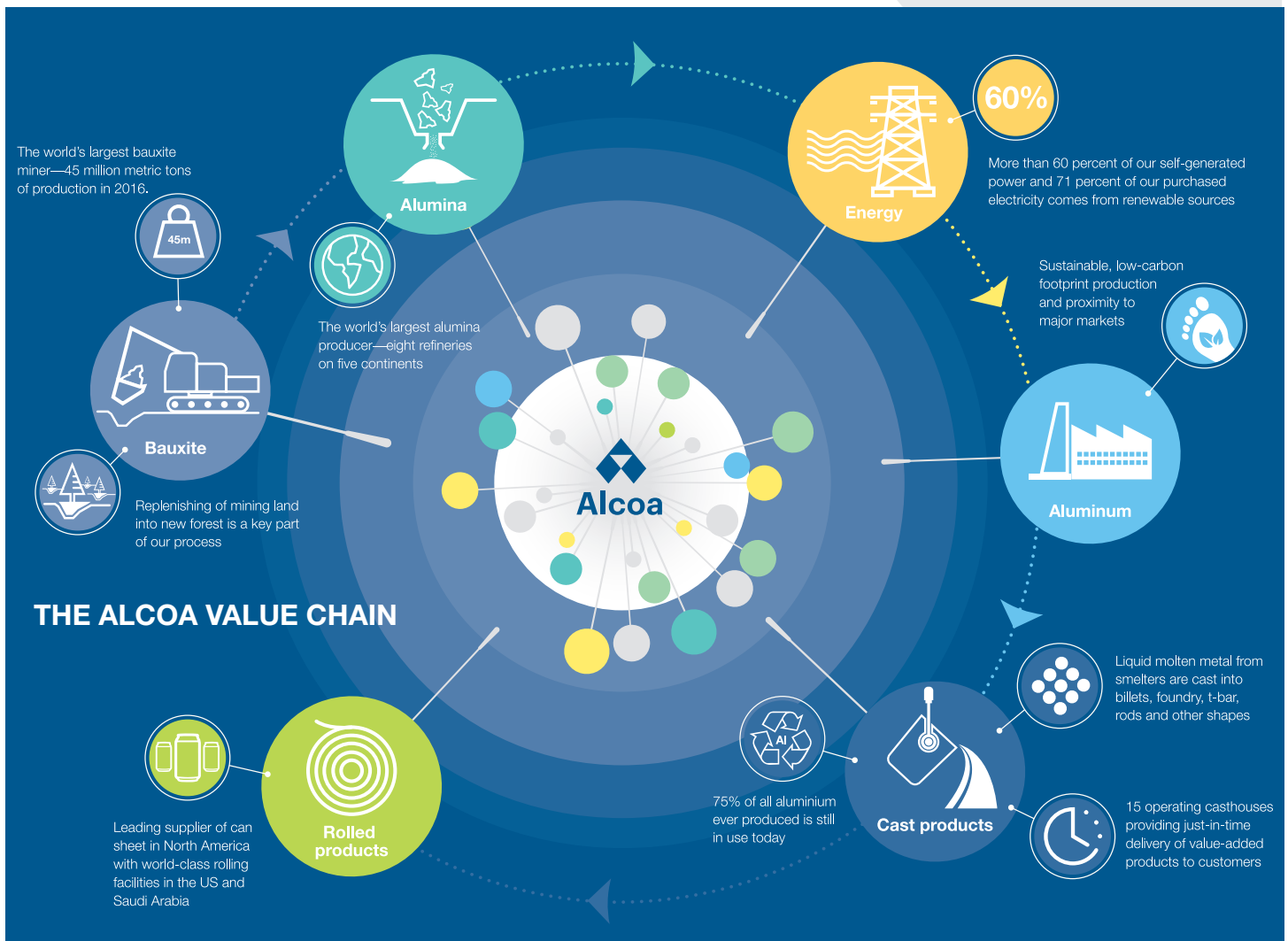
Bauxite

We are the world's largest producer of bauxite ore. Because our high-quality and reliable bauxite is mined responsibly, it helps reduce supply chain risk for any downstream user.

The sustainability of our mining operations begins with engaging stakeholders to develop a rehabilitation plan before operations commence. We minimize operational impacts and use innovative techniques to prepare former mine lands for future beneficial use. See the [Land Management](#) section for more information.

Alumina

We lead the world in producing alumina, which is refined from bauxite ore. Our sustainability challenges in refining are water



The number of refineries and casthouses includes the Alcoa/Ma'aden joint venture in Saudi Arabia.

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 Emissions](#) sections.

Aluminum

Smelting alumina to produce aluminum is an energy-intensive process that emits greenhouse gases. We have achieved significant success in reducing our energy usage and emissions and are an industry leader in developing technology and implementing process controls to further reduce impacts from smelting. See the [Energy](#) and [Climate Protection](#) sections for details.

Cast Products

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

Our new SUSTANA line of environmentally friendly aluminum products includes ECOLUM cast products, which are produced at Alcoa hydro-powered smelters that generate no more than 2.5 metric tons of carbon dioxide equivalents per metric ton of aluminum produced—75 percent better than the industry average. Each ECOLUM product is issued a certificate of origin that verifies its carbon emissions.

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 recycled content and is produced with up to 95 percent less energy. ECODURA and ECOLUM products can contribute to [LEED](#)[®] and [BREEAM](#)[®] certifications.

Our Alcoa Specialty Alloys offer higher strength and better thermal performance for new lightweighting solutions. This product family includes SupraCast[™], EZCast[™], VersaCast[®] and EverCast[™] alloys.

Rolled Products

Our flat-rolled aluminum is used for food and beverage containers, lithographic printing plates and industrial product applications. We take an active role in helping increase the amount of used beverage containers available for recycling globally, and we use these products in the production of our aluminum. See the [Recycling](#) section for additional information.

Recycling

Aluminum is infinitely recyclable, 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. Recycling aluminum uses about 8 percent of the energy required to make new aluminum ingot and emits 92 percent fewer greenhouse gases.

We recycle aluminum primarily 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.

“Alcoa’s deep commitment to supporting the principles of the circular economy can be seen in its long, active history of improving recycling on a global basis. In America, Alcoa Foundation’s solid support as an inaugural funder of The Recycling Partnership shows how it regularly bridges from thought leader to change maker.



Keefe Harrison
CEO
The Recycling Partnership

Their early and continued support took vision, commitment and an understanding of the systems solutions that were needed to make positive improvements in towns all across the country. We look forward to a long and productive partnership with Alcoa as we continue to increase the recovery of aluminum, together.”

In our primary aluminum casthouses, we use purchased third-party and closed-loop scrap to produce our ECODURA billet. Part of our new SUSTANA line of aluminum products, this billet has a minimum of 50 percent recycled content.

2016 at a Glance

405,513
metric tons
of scrap
recycled



In 2016, we used 405,513 metric tons of scrap in our global operations. We anticipate increasing our scrap usage, particularly at our Warrick Operations location in the United States, over the next few years.

Our recycling efforts extend beyond our own operations to include partnerships with established recycling initiatives. In the United States, for example, Legacy Alcoa Foundation was a founding partner of [The Recycling Partnership](#), and Alcoa Foundation continues to provide financial support and have representation on the board of directors. Alcoa



Used beverage cans awaiting recycling

Corporation also contributes expertise to the organization, which uses public-private partnerships to improve recycling at the local level.

With Alcoa Foundation and Alcoa Corporation support, The Recycling Partnership has expanded its reach to 250 communities across the United States. Its work eliminates an estimated 60,000 metric tons of carbon dioxide, saves 3.7 million cubic meters (1 billion gallons) of water, and collects 35,000 metric tons of recyclables on an annual basis.

Process Waste and Byproducts

In addition to recycling scrap, we actively seek to recycle or reuse our process wastes and byproducts.

For example, we are a leader in finding ways to transform spent pot lining—the carbon and refractory lining of smelting pots that has reached the end of its serviceable life—into a raw material or fuel source for other industries.

See the [Waste and Emissions](#) section for additional information.



Creating Sustainable Value
in Communities

Economic Value

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. We do this by providing well-paying jobs, procuring goods and services from local suppliers, paying income and other taxes and investing in community infrastructure and initiatives.

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

2016 Alcoa Economic Value

U.S. dollars

	Australia	Europe	North America	South America	Total
Labor Costs (billions)	0.5	0.2	0.8	0.1	1.6
Procurement Spend (billions)	1.7	1.8	3.2	1.1	7.8
Income Taxes (millions)	211.2	2.7	41.5	9.8	265.2

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. The amounts in the table above do not include labor costs related to corporate functions and activities for the first 10 months of 2016, as Alcoa Corporation was not a separate standalone company until Nov. 1, 2016. Such functions and activities were provided on a centralized basis by Alcoa Corporation's former parent company through Oct. 31, 2016.

Income tax amounts are net of income tax refunds received and exclude various other taxes, such as sales taxes, excise duties, levies and local taxes not based on income.

2016 Alcoa Foundation Economic Value

Millions of U.S. dollars

Australia	0.94
Europe	0.88
North America	0.85
South America	0.64
Global Outreach	3.03
Total	6.34

Data are estimated.

Complete details on our 2016 financial performance can be found in the [Alcoa Annual Report](#).

2016 at a Glance

US\$7.8 billion spent with suppliers



US\$6.3 million estimated in community investments

Stakeholder and Community Engagement

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

We define a stakeholder as any person or organization that impacts, or is impacted by, our activities. This includes stockholders, employees, customers, suppliers, government representatives and regulators, non-governmental organizations, local communities and 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 engagement with other stakeholders is typically much less formalized and requires attention to ensure that it is maintained on a regular basis.

At the location level, our operations use the Alcoa Community Framework to guide stakeholder engagement. The framework provides a systematic process to first identify appropriate stakeholders and then engage with them in the most effective manner, ensuring transparent and ongoing dialogue. Many locations have community advisory boards, which include community representatives who meet with Alcoa leaders.

We also engage with stakeholders, primarily local communities and non-governmental organizations, through [Alcoa Foundation](#). Approximately 50 percent of the foundation's annual budget is used for local initiatives in the areas of education, environment, governance and community enhancement. The remaining 50 percent is dedicated to global signature partnerships and programs focused on climate change and biodiversity.

“Over our eight years of partnership, Alcoa has played a key role in the Associação Poços Sustentável (APS) community advisory board through its counsel and financial



Terezinha Couto
Executive Director
Associação Poços Sustentável
Poços, Brazil

support. The alignment between APS' objectives and Alcoa's sustainability approach has also contributed to the implementation of important Alcoa programs in the community.

We consider the partnership to be an example of a relationship between a private company and social organization based on transparency and shared principles and values, with benefits for both.”

The following key issues were raised by, or discussed with, stakeholders in 2016.

2016 Stakeholder Issues

Location	Issue	Action
Anglesea, Australia	<p>We were required to develop a revised closure plan for the coal mine and draft master plan for the power station's freehold land.</p>	<p>We engaged extensively with the local community and key stakeholders to gather input to help inform both plans. Actions included workshops, community events, newspaper advertorials, briefings and an online engagement platform.</p> <p>In collaboration with the Anglesea community, Victorian government and Surf Coast Shire representatives, we developed and published Guiding Principles to help inform the development of both plans.</p> <p>We will release the plans in 2017. The revised mine closure plan will be submitted for approval to the Victorian government's Earth Resources Regulation in mid-2017.</p>
Kwinana, Australia	<p>Two residential developments were proposed less than 1.5 kilometers (0.9 miles) from our Kwinana refinery's bauxite residue storage area and mostly within the Kwinana air-quality buffer adopted by the Western Australian Planning Commission in September 2010.</p> <p>In 2014, we opposed the residential developments and were successful in proceedings before the State Administrative Tribunal, which prevented progress of the development.</p> <p>In 2016, the property developers undertook a judicial review challenge in the Supreme Court.</p>	<p>The Supreme Court upheld the 2014 State Administration Tribunal recommendation that development not be permitted within the buffer.</p> <p>Following the court's decision, the minister for environment requested that the Environmental Protection Authority (EPA) provide advice on the size of the proposed Kwinana industrial buffer in relation to impacts associated with current and future land uses in the Mandogalup area. We provided information to inform the EPA's advice to the minister, which is anticipated in the second quarter of 2017.</p>
Point Henry, Australia	<p>We continued decommissioning the site of our Point Henry smelter, which ceased operations in 2014, and engaged community stakeholders on the future of the site.</p>	<p>Following a 12-month community consultation process involving workshops, briefings, community events, newspaper advertorials, an online engagement platform and invited public submissions, we developed a shared vision for the future of the 575-hectare (1,420-acre) site on the Point Henry peninsula.</p> <p>This shared vision helped inform a draft concept master plan. After the plan's release in October 2016, we sought feedback from stakeholders via public events, briefings, an online engagement platform and a survey. The feedback will inform the final Point Henry 575 Concept Master Plan, which will be released in 2017.</p>

2016 Stakeholder Issues

Location	Issue	Action
Portland, Australia	<p>From mid-November 2015 to mid-January 2016, Maritime Union of Australia (MUA) seafarers employed on our MV Portland refused to sail the ship from the Port of Portland to Singapore for delivery to its new owners.</p> <p>The Australian Fair Work Commission and the Australian Federal Court had ordered the industrial action to stop. Despite this, the MV Portland remained stranded in port, disrupting port operations and the lives of other crew members and threatening the Portland community with the loss of cruise ship visits.</p>	<p>To resolve the issue, we wrote to and held meetings with the MUA and ASP Ship Management, the crew's employer.</p> <p>To explain the issue, we sent letters to Portland businesses, published open letters to the community in the local newspaper and issued media releases.</p> <p>After a two-month stalemate, ASP Ship Management and Alcoa took decisive action to end the protracted illegal industrial action by replacing MUA seafarers on the MV Portland who had refused to sail the vessel.</p>
Portland, Australia	<p>The expiration of a 32-year electricity supply agreement with the Victorian government in October 2016 exposed the Portland smelter to higher transmission costs and power prices not linked to the global aluminum price. With persistently low aluminum prices, this added significant pressure to the viability of the smelter.</p> <p>In December 2016, a fault on the Victorian transmission network caused a significant power outage at the smelter, leading to the loss of one potline and leaving only a portion of the second potline operating in the final weeks of the year.</p>	<p>We engaged with our Portland Aluminium joint venture partners, the Victorian and federal governments, unions, community leaders and employees in an effort to find a workable solution that secured the smelter's position in future years. These discussions were conducted in a climate of escalating electricity prices in Victoria, which increased by more than 50 percent in 2016.</p> <p>At the close of the year and in light of the power outage, we enabled up to two thirds of the workforce to take paid annual leave while production remained curtailed. This ensured a safe and efficient operation and minimized any hardship to families and the larger community while an assessment of the plant was completed.</p> <p>In early 2017, we began restarting the lost capacity. We also announced that we had reached four-year agreements with the Victorian state and Australian federal governments and energy supplier AGL.</p>
Western Australian Mining Operations	<p>To determine the commercial viability of mining in new areas, we commenced exploration drilling near the township of Dwellingup in 2015 following consultation with nearby landholders.</p> <p>We committed to share the results of the exploration program in 2016 with the community.</p>	<p>We wrote to Dwellingup landowners and tenants in November 2016 to provide the results of initial drilling and to specify how the results impact our long-term strategic plan.</p> <p>We wrote letters to local, state and federal government representatives, held group stakeholder meetings and briefed employees who live in Dwellingup.</p> <p>We continue to communicate one-on-one with interested neighbors as required.</p> <p>The commercial viability of mining ore in one of the drilling areas, Teesdale West, will be further assessed via a detailed feasibility study that we anticipate will be completed in the second half of 2017.</p>

2016 Stakeholder Issues

Location	Issue	Action
Willowdale and Wagerup, Australia	<p>A devastating bushfire swept through an extensive area in and around the Willowdale bauxite mine and Wagerup alumina refinery in January 2016, impacting production at both the mine and refinery.</p> <p>The Australian Manufacturing Workers' Union claimed we compromised the safety and well-being of employees during the bushfire.</p> <p>Of the 80 Alcoa-owned houses on residential and semi-rural properties in northern Yarloop, 35 were destroyed. Almost all of the Alcoa houses were let to tenants.</p>	<p><u>The welfare of our employees was paramount</u>, and we did everything to ensure employees at the mine site and refinery were safe during the two days the fire was a threat. No injuries to employees or contractors were reported as a result of the fire.</p> <p>To provide relief to tenants of Alcoa-owned houses, we suspended rental payments and helped townspeople with equipment, such as generators and water tanks. Alcoa volunteers also assisted residents at their properties.</p> <p>All but one of the destroyed houses were within the refinery's informal buffer zone (known as Area A in the Wagerup Refinery Land Management Plan). We made the decision to not rebuild any homes inside the zone. We also worked alongside the state government and local shire to clean up the properties to ensure future compatible land use.</p> <p>We donated US\$74,000 to the Perth Lord Mayor's Distress Relief Fund, and Legacy Alcoa Foundation provided a US\$50,000 disaster relief grant to the Salvation Army to further support recovery efforts. We also worked with local communities to assist in relief efforts during the months that followed.</p>
Juruti, Brazil	<p>The mayor of Juruti and the Public Ministry separately asked for additional information regarding the Juruti mine's Positive Agenda, which is our voluntary commitment to invest in the community.</p>	<p>We replied promptly to both requests with updated information. We also invited the public prosecutor to tour the mine site and learn more about our operations, which he accepted.</p>
Poços de Caldas, Brazil	<p>On Jan. 19, 2016, a strong storm flooded areas within the city, causing significant damage to residences, workplaces and infrastructure.</p>	<p>We donated approximately US\$1,250 for immediate cleanup of the city, and Alcoa Foundation contributed another US\$15,000 for disaster relief.</p>
Portovesme, Italy	<p>Redevelopment activities for our curtailed Portovesme smelter raised the concern of community stakeholders, who requested the government try one more time to find a potential investor through Invitalia, the government entity that attracts investment.</p>	<p>We are working with Invitalia and the Italian government to conduct due diligence on the smelter's assets in preparation for Invitalia potentially taking over the facility to find a potential investor or Alcoa continuing with its remediation and decommissioning plans.</p> <p>We also continued our interaction with local, regional and national institutions on remediation permitting matters, as well as a possible sale of the facility to Invitalia.</p>

2016 Stakeholder Issues

Location	Issue	Action
Mosjøen, Norway	We continued to concurrently remediate the Alcoa Mosjøen harbor, which contains sediments with polycyclic aromatic hydrocarbon (PAH) contamination, and extend a wharf shared with the municipality.	<p>We interacted extensively with various national, regional and local stakeholder groups. We are combining forces to plan and execute the remediation in the most effective way.</p> <p>We are using the opportunity to improve the harbor and extend the wharf shared with the municipality, making it possible to accommodate larger vessels.</p>
Avilés, La Coruña and San Ciprián, Spain	We continued seeking a long-term competitive energy framework necessary for the viability of our Spanish smelting operations.	<p>We participated in the annual energy auction of interruptibility services held in late 2016. This delivered higher value to our Spanish system in 2017 than previous years.</p> <p>We continue working with the government to achieve a power solution that provides a long-term competitive energy framework.</p>
Washington State, United States	In October 2016, the state government adopted a clean air rule that caps and reduces carbon pollution. Additional bills have been introduced in the state legislature regarding carbon taxes. Our Intalco and Wenatchee smelters are located in the state.	We engaged with the governor, legislators, regulators and non-governmental stakeholders to be a substantive contributor to the rule and bill-making processes. Part of this engagement was educating the stakeholders on early actions we took at our Intalco and Wenatchee smelters in the state to reduce greenhouse gas emissions 75 percent and 48 percent, respectively, from a 1990 baseline.

Non-governmental Organization Engagement

Non-governmental organizations provide significant value to society. We partner with these institutions to support and advance their work in the areas of climate change and biodiversity in the communities in which we operate.

The following are some examples of recent partnerships.

National Wildlife Federation and Foundation for Environmental Education

At 40 schools around the world, students and faculty are increasing their environmental literacy through the Alcoa Waste-Water-Watts (Alcoa W3) project delivered by the [National Wildlife Federation](#) and the [Foundation for Environmental Education](#). The project introduces the concept of “[Green STEM](#),” which combines traditional science, technology, engineering and mathematics disciplines with environment-based education. The participating schools are also encouraged to reduce their energy and water usage, increase waste recycling and decrease consumption.

NatureServe

There is currently no widely accepted tool, key or standard that guides ecological restoration decisions regarding what species to plant where in anticipation of climate change. With funding from Legacy Alcoa Foundation, [NatureServe](#) is piloting the first of these tools in the Blue Ridge ecoregion in the United States. The organization anticipates the tool will help with the climate-smart restoration of more than 2,000 acres using 40,000-plus trees and will stimulate expansion to other ecoregions.

Pure Earth

Pure Earth’s [Toxic Sites Identification Program](#) (TSIP) identifies, screens and prioritizes contaminated sites that pose a human health risk in low- and middle-income countries. With Legacy Alcoa Foundation support, [Pure Earth](#) is implementing the program in the Brazilian state of Bahia. The state contains 219 identified contaminated sites—none of which are Alcoa sites—and approximately 320,000 inhabitants who are exposed to contamination. The program is building local capacity by providing state-of-the art chemical screening

equipment and training local experts in toxic site screening protocols. Pure Earth also will design a guidance document for toxic site identification for use by government officials in every Brazilian state.

World Resources Institute Brazil

Using tools developed by the [World Resources Institute](#) (WRI) with Legacy Alcoa Foundation support, landowners in the Brazilian state of Para are now able to quantify their carbon emissions and comply with national and international commitments. They also will have access to training on low-carbon agriculture practices. In addition, WRI will train women to become active participants in forest restoration practices in relevant areas of the state, including the municipalities of Juruti and Paragominas.

World Wildlife Fund

With funding from Legacy Alcoa Foundation, World Wildlife Fund (WWF) is working with other groups to collect data through a new crowdsourcing initiative known as [Climate](#)

[Crowd](#). After analyzing collected data to search for trends on the impacts of climate change on communities, WWF will develop and implement strategies that help communities adapt to change without negatively impacting biodiversity, particularly WWF's priority species.

Memberships

The following are some of the organizations in which we are a member or participant:

- [Aluminium Association of Canada](#)
- [Aluminum Stewardship Initiative](#)
- [Australian Aluminium Council](#)
- [Brazilian Aluminum Association](#)
- [European Aluminium](#)
- [International Aluminium Institute](#)
- [The Aluminum Association](#)

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

Case Study

Advanced Software Predicts, Manages Community Noise Levels

At our Huntly bauxite mine in Western Australia, customized software and monitoring procedures help ensure that noise levels stay at or below regulatory limits for residents of nearby areas.

Mining bauxite ore, with its massive equipment and rock-busting activities, is a noisy operation. Employees wear hearing protection, but minimizing noise reaching nearby residents can prove more difficult and involves engaging with these stakeholders to ensure their concerns are received, understood and addressed.

Implemented in May 2016, the new software integrates a host of data, including weather (one of the biggest factors in noise dispersion), equipment noise levels, topography and operational locations. With this data, the software can predict operational noise levels for specific days and locations. The results are used to determine which sites to mine on a given day, up to two weeks in advance.

The software also incorporates a real-time management tool that alerts the operations team if noise levels exceed specific parameters. Operators can take immediate action

to mitigate the noise, such as shutting down or swapping out equipment or moving to another area.

In 2015, Huntly mine received 25 resident complaints regarding operational noise. That number decreased 36 percent in 2016, with the majority of complaints occurring before the software's implementation. Each complaint was followed up with personal contact from a mining representative.



Onsite noise monitoring at Huntly mine

Our People

We care for our people by attracting and developing the best talent, fostering a culture of continuous growth and learning and cultivating an environment of trust and integrity.

As Alcoa becomes a leaner, more agile company in constant pursuit of stronger performance, our success will depend on the skills, experience and decision-making of every employee. It's imperative that we attract diverse and talented employees, increase their potential to grow and learn and incentivize them to perform at the highest level to advance our strategic business vision.

In 2016, we began transforming and modernizing our approach to talent management, breaking down silos and connecting all aspects to create a seamless, transparent and holistic experience.

2016 Employees by Employment Contract and Type				
	Contract		Type	
	Permanent	Temporary	Full-time	Part-time
Male	12,000	350	11,900	450
Female	1,800	150	1,700	250
Total	13,800	500	13,600	700

All of the organization's work is performed by people who are employees of the company or are contractors supervised by employees of the company. We do not engage any other classes of workers, including those who are legally recognized as self-employed, to perform the company's work. Temporary employees are those 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).

Diversity, Inclusion and Engagement

Our success depends on our ability to create innovative solutions that exceed our customers' goals. To achieve this, we engage employees and leverage their diversity of thought, experience and skills. Driving our progress are meaningful goals built into our operations, compensation and human resource systems.

All Alcoa leaders are held accountable for inclusion and diversity. In 2016, we linked the results to our annual variable compensation through two strategic sustainability targets to increase global female employment and U.S. minority employment in the professional and executive ranks. These targets, which represent a combined 10 percent of the total

2016 at a Glance

14,300
employees
globally



100 score
on the
Corporate
Equality
Index 2017



variable payment opportunity, are updated annually. The 2016 targets at the executive level were:

- Global women: 20.9 percent; and
- U.S. minorities: 23.4 percent.

At the end of 2016, women comprised 20.9 percent of our global executive positions, and minorities accounted for 24.3 percent of our U.S. executive positions.

In 2017, the target will focus on women at all levels in our organization to better reflect our current business, which has a reduced footprint in the U.S. after the separation from Alcoa Inc. Although U.S. minorities will no longer be a target that will be linked to variable compensation, we will continue to measure our progress in expanding opportunities for these employees.

Global Women in Professional and Executive Positions

Percent

	Professional	Executive
2015	21.7	19.8
2016	20.7	20.9

U.S. Minorities in Professional and Executive Positions

Percent

	Professional	Executive
2015	23.7	24.2
2016	17.6	24.3

We also have numerous employee networks that advocate on behalf of specific employee groups around the world. These include:

- Alcoa Women’s Network;
- Alcoa African Heritage Network;
- Employees at Alcoa for Gay, Lesbian, Bisexual and Transgender Equality (EAGLE);
- Alcoa Veterans Network; and
- Site-based networks.

“For me, diversity in a workplace is all about creating an environment where everyone knows and feels that they have the same opportunities, and where the leaders of the company urge minority groups to use these opportunities to advance within the workplace. We need to actively think of ways to create a more diverse workplace and attract a more diverse group of people. In doing so, our company will become stronger and more competitive. Here at Alcoa Fjarðaál, we changed our shift system to make it more family-friendly. As a result, we are a more attractive workplace for a more diverse group of people in regards to both gender and age.”



Dagmar Ýr Stefánsdóttir
Communication Manager
Alcoa Fjarðaál, Iceland

for [LGBT Equality](#). The index evaluates U.S. companies on lesbian, gay, bisexual and transgender (LGBT) equality.

Alcoa Inc. also received top ranking from [PFLAG](#) for its 2016 Straight for Equality in the Workplace Award, which recognizes outstanding leadership in creating inclusive and supportive workplaces for LGBT employees through the engagement of allies. In addition, Alcoa of Australia was named—for the 15th year in a row—an Employer of Choice for Gender Equality by the Australian government.

Talent Acquisition

A key part of creating a more nimble and productive workforce is attracting the best talent that has the skills, values and ideals that align with our culture.

In 2016, we developed a modern, efficient approach that simplifies and streamlines our talent acquisition organization and processes. This allows our hiring managers, human resources, employees and prospective candidates to collaborate quickly and easily.

We are also implementing technology to optimize our acquisition processes and create a better candidate experience. Initiatives include global posting of open positions and collaborative and mobile recruiting capabilities.

To cultivate the best candidates within the company and promote mobility and career growth, we focus on our internal people first. As new positions open, our recruiters search within the company for candidates.

Internal and external candidates must have a clear, compelling desire to plan their future with Alcoa. As such, we are strengthening our recruiting brand by showcasing the many benefits of Alcoa.

People Development

We believe people development should support our business goal of reducing complexity and being more agile.

To achieve this, we began transforming our people development process in 2016 using a holistic approach with three pillars of action:

- Alignment of goals with key business drivers;
- Future-focused career growth and development; and
- Continuous feedback and coaching.

In developing the new process, we conducted external benchmarking and sought input from employees through focus groups and surveys to determine what should be kept, eliminated and added to the existing process.

Our predecessor, Alcoa Inc., achieved a top score of 100 on the Human Rights Campaign Foundation’s [Corporate Equality Index 2017](#), earning the designation as a [Best Place to Work](#)

The new process will replace the three-times-a-year review process with frequent check-ins and untracked manager coaching. In early 2017, we began rolling out a new behavior model that better aligns with our new values and business strategy and more clearly defines career stages. We are also evaluating technology that will simplify the performance process and ensure our employees, managers and human resources professionals have access to the same information.

Learning and Development

Ensuring our people have the skills and knowledge they need to perform their roles is fundamental to their success and that of our company.

In 2016, we continued a number of leadership development programs that included the Global Leadership Development, Advancing Supervisory Excellence and Technical Emerging Leaders Education Development programs. In partnership with the University of Pittsburgh, we also offered two sessions of Alcoa Management Essentials to more than 40 employees globally to build business acumen.

All employees and many Alcoa contractors have access to AlcoaLearn, our global online learning management system. As of separation, there were more than 19,000 active employee and contractor accounts in AlcoaLearn for training tracking and online learning access. In 2016, the system housed more than 8,000 online courses and supported the administration of 11,000-plus instructor-led training sessions for a total of 620,655 recorded training hours. Additionally, we support employee participation in professional certification, leadership development and other external training programs not tracked through our learning management system.

Our goal moving forward is to promote learning every day to all employees through technology, mentoring and coaching, with a focus on in-role learning. Initiatives include:

- Using webinars, online resources and learning tracks that appeal to the modern learner;
- Replacing our top-talent mentoring program with the Alcoa Trusted Advisor Network for all employees;
- Supporting the deployment of the new performance and development process through targeted skills-based training on coaching, giving feedback, delegation and other topics;
- Developing a global mobility policy that will improve accessibility to growth opportunities in different cultures; and
- Creating a development toolkit that leverages all available learning opportunities and tools.

To drive a culture change related to career conversations that are owned and driven by the employee, all employees will have access to career maps to guide their development and inform both performance discussions and the talent review process.

Compensation

To attract, retain and motivate our employees, we provide compensation that is competitive within the relevant labor market and rewards behaviors that deliver results against business goals.

Up to 20 percent of our annual variable compensation plan formula at the corporate level is tied to achieving significant aspects of our sustainability targets. These include safety, diversity representation in our workforce and reductions in carbon dioxide emissions due to process improvements and improved energy efficiency.

2016 Sustainability Variable Compensation Targets		
Category	Percent of Annual Variable Compensation Plan Formula	Payout Percent
Safety	5	4.2
Diversity	10	11.4
Environment (carbon dioxide reductions)	5	0

For additional compensation information and data, see the [Economic Value](#) section of this report and the Compensation Discussion and Analysis in our [2017 proxy statement](#).

Human Rights

Wherever we operate in the world—from the Brazilian Amazon to the fjords of Iceland and the Saudi Arabian desert—we are committed to human rights.

We believe that commitment extends beyond simply having a policy. We must ensure our actions and those of each employee, supplier and business partner exemplify our commitment.

Programs and processes that we have in place to encourage and monitor human rights include:

- The [Alcoa Code of Conduct](#) and employee training, both of which cover human rights;
- [Supplier Standards](#) that explicitly indicate respect of human rights;

- Internal and third-party supplier assessment programs for new and existing suppliers (See the [Supply Chain](#) section);
- An [Integrity Line](#) for employees, suppliers and the general public to report ethical and human rights violations; and
- Participation in the United Nations Global Compact.

We will act quickly and decisively upon notification of any potential violations to our policy. We had zero reported violations in our operations in 2016.

Human Rights Policy

Alcoa is a global enterprise that does business in many distinct local markets. In order to do so successfully, we rely on all Alcoans living Alcoa's [Values](#).

Values provide the common framework for our decisions, actions and behaviors. They are our universal language—transcending culture and geography. Living our Values requires us to meet the highest standards of corporate behavior in all aspects of business in all regions of the world.

The foundation of our Values is integrity and caring for people, which are fundamental to our enterprise.

Alcoa's approach to issues involving human rights is guided by our Values.

Children and Young Workers

As a fundamental principle, we do not employ children or support the use of child labor. We do encourage the creation of educational, training or apprenticeship programs tied to formal education for young people.

Freedom of Engagement

We believe that people should work because they want or need to, not because they are forced to do so. We prohibit the use of prison labor, forcibly indentured labor, bonded labor, slavery or servitude.

Equality of Opportunity

We recognize, respect and embrace the cultural differences found in the worldwide marketplace. Our workplace is a meritocracy, where our goal is to attract, develop, promote and retain the best people from all cultures and segments of the population, based on ability. We have zero tolerance for discrimination or harassment of any kind.

Compensation

We ensure that compensation meets or exceeds the legal minimums and is competitive with industry standards. Our compensation philosophy is clearly communicated to employees and is in full compliance with all applicable laws.

Freedom of Association

We recognize and respect the freedom of individual Alcoans to join, or refrain from joining, legally authorized associations or organizations.

Relationships with Indigenous People

Within the framework of our Values, we respect the cultures, customs and values of the people in communities where we operate and take into account their needs, concerns and aspirations.

Safety

We work safely. These three simple words found in our [Values](#) underscore our commitment to safety.

Our work is dangerous and complex. Process stability and equipping our people with skills, knowledge, controls and protection are required to avoid injuries in our operations.

Each day, we strive for what we believe is the attainable goal of zero fatalities, serious injuries and serious illnesses. It is an ambitious goal, but we have a strong legacy of safety leadership in not only our industry but manufacturing as a whole.

“While working at an Alcoa location, we feel we are empowered to stop when something looks wrong. Our Alcoa contacts remind of this on a daily basis and recognize us when we do stop for safety. This is not the case at other companies where we work.”



J.M. Esmoris
Contractor
Montaxes Dimar
Spain

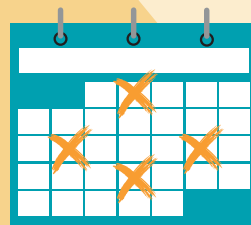
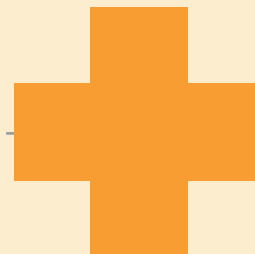
In 2016, we were reminded of the difficulty of our goal when we experienced a fatality at our Alumar location in Brazil. A contractor using an electric hand drill made contact with a live extension cord outlet, resulting in a fatal electric shock. We conducted a thorough investigation of the incident and communicated the findings to all of our locations and industrywide.

We had 269 reported fatal and serious injury/illness (FSI) events, which include actual and potential incidents, during 2016. This was 58 percent fewer reported incidents than 2015, which we attribute to increased controls for critical risks, ongoing work on how to report and classify FSI events and facility curtailments and closures.

In 2017, we will begin focusing on this and other leading indicators rather than just traditional lagging indicators, such as lost workday rate and total recordable incident rate, to better identify and predict our risk of a fatality or serious injury and illness.

2016 at a Glance

1 contractor fatality



21% decline in days away, restricted and transfer rate

21% increase in lost workday rate



1% reduction in total recordable incident rate

Our 2016 results for traditional safety rates varied. Our days away, restricted and transfer (DART) rate declined 21 percent, and our total recordable incident rate (TRIR) showed a slight improvement. We experienced a 21 percent increase in our lost workday rate, primarily due to a significant jump in the European and Australian rates that we will focus on rectifying in 2017. Despite the increases, our lost workday rate remained significantly below the U.S. manufacturing average.

Fatalities

Employees and supervised contractors/non-supervised contractors

	Global	Australia	Europe	North America	South America
2012	1/0	0	0	1/0	0
2013	0/0	0	0	0	0
2014	0/1	0	0	0/1	0
2015	2/1	0/1	0	2/0	0
2016	0/1	0	0	0	0/1

Fatal and Serious Injuries/Illnesses

Employees and supervised contractors

	FSI Actuals (Events resulting in a fatal or serious injury/illness)	FSI Potentials (Near-miss events)	Total FSI Events
2014	11	666	677
2015	4	636	640
2016	4	265	269

A serious injury/illness is any incident that is life-threatening or life-altering. We began formally tracking FSIs in 2014.

Days Away, Restricted and Transfer Rate

Employees and supervised contractors

	Global	U.S. Manufacturing Average	Australia	Europe	North America	South America
2012	0.63	2.4	1.45	0.10	0.60	0.17
2013	0.47	2.2	1.10	0.10	0.48	0.14
2014	0.47	2.2	0.80	0.21	0.55	0.06
2015	0.38	2.2	0.45	0.26	0.46	0.15
2016	0.30		0.56	0.20	0.23	0.11

The 2016 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 supervised contractors

	Global	U.S. Manufacturing Average	Australia	Europe	North America	South America
2012	0.14	1.1	0.53	0.03	0	0.09
2013	0.16	1.0	0.44	0.10	0.08	0.10
2014	0.15	1.0	0.41	0	0.10	0
2015	0.14	1.3	0.25	0.03	0.12	0.11
2016	0.17		0.32	0.10	0.11	0.11

The 2016 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 supervised contractors

	Global	U.S. Manufacturing Average	Australia	Europe	North America	South America
2012	1.28	4.3	2.63	0.27	1.36	0.42
2013	1.25	4.0	2.23	0.49	1.49	0.43
2014	1.55	4.0	1.92	0.59	2.23	0.33
2015	1.34	3.8	1.27	0.77	1.88	0.34
2016	1.32		1.48	0.92	1.65	0.46

The 2016 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.

Comprehensive safety data are provided in the [Appendix](#).

Safety Strategy

During 2016, we revised our safety strategy so it is better aligned with the risks and opportunities of our new company. This strategy has a two-pronged focus—preventing and mitigating fatalities and life-altering injuries, and implementing more transparent, accessible and inclusive reporting.

Prevention and Mitigation

We strive to understand how work is actually performed and its associated risks rather than how we perceive it to be performed.

As we prepared to separate into a new company in 2016, we began refocusing our fatality prevention process and improving our safety basics. Our efforts, which focused on the plant floor and operational work areas, included:

- **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. Corporate safety and each business unit provide global oversight and verification.

- **Critical 6 plus 1:** The registry starts with tasks associated with our six most critical FSI hazard categories—mobile equipment, crane, confined space, fall control, lock/tag/verify and electrical. A seventh critical hazard is specific to each production process—mining (haul trucks), refining (chemical burns), smelting/casting (molten metal) and rolling (machine guarding).
- **Risk-based assessment:** Conducted by our corporate safety experts in collaboration with location staff, this periodic assessment identifies high risks not through paperwork but an on-the-plant-floor evaluation.
- **Worker on Foot initiative:** Anytime a vehicle is in an area, there can be no people on foot in that area and vice versa. This goes beyond pedestrians to cover employees working in the area.
- **Human performance:** Locations must work toward certification in a core operating standard based on human performance, which teaches employees how to anticipate and recognize error and error-likely situations to predict, reduce, manage and prevent fatalities and injuries from occurring.
- **Skill builders:** These one- to two-day training sessions for new safety personnel and employees with single point of accountability for safety are focused on a critical safety topic. Mobile equipment and fall control are the topics for 2017.
- **Environment, health and safety (EHS) onboarding system:** We initiated the development of an updated onboarding system in 2016 to acclimate new EHS employees, plant managers and vice presidents of operations to our EHS culture.
- **Contractor safety process:** We completed the rollout of a new contractor safety process in early 2017 in our alumina business unit. We use the process to evaluate the safety risk of each contractor and the work being performed to determine how much Alcoa oversight and intervention is required.

All of our employees are also empowered to stop their work or that of a colleague if they believe the situation is unsafe or if they are unsure of the potential outcome. To recognize such proactive efforts, we present those who stop work with the Alcoa STOP coin.

Case Study

Initiative Keeps People, Mobile Equipment Separated

Alcoa's Worker on Foot initiative is using rules and technology to reduce or eliminate the high risks of interaction between people and mobile equipment—one of the most significant safety challenges in our facilities.

Since the program's 2016 launch, all of our smelters and casthouses identified the locations where workers and mobile equipment could overlap. The facilities next developed rules on entering and exiting each of these mapped areas, ensuring that workers are not present when mobile equipment is operating. These rules range from visual contact and three-way communication to permits.

In instances when workers must be in an area where mobile equipment is operating, they must stand within a designated safe spot. They cannot leave the protected area until the mobile equipment has stopped or left.

Supplementing these rules is human detection technology, which includes radio-frequency identification, Wi-Fi, laser radars and parking assistance detectors. The smelters and

casthouses also have installed visual safety enhancements, such as blue spotlights aimed on the floor, to help identify safety boundaries and blind spots.

In 2015, our smelters and casthouses globally experienced one fatality and four injuries due to worker and mobile equipment interaction. That declined to zero fatalities and one injury in 2016.



Designated safe spot

Reporting

Beginning in 2017, our safety rates will include employees, temporary workers and supervised and non-supervised contractors. This One Alcoa approach will further drive ownership of safety to include every person at our sites.

We also will increase the transparency of our reporting and improve our investigations. All employees will have access to our safety data and learnings on a plant and global level. Especially important will be the shared learnings from leading metrics, such as FSI data.

Other new metrics that we will monitor are closing-out actions on high-risk findings from the risk-based assessment and FSI events, as well as the completion rate of putting controls in place for the critical 6 plus 1 risks.

Safety Self-assessments

In addition to critical risk management, each of our locations periodically must undertake a self-assessment to further pinpoint areas requiring improvement.

In 2016, we experienced declines in each category due, in large part, to stricter requirements.

Alcoa Self Assessment Tool Rating					
Percent of locations receiving a "Good" or better self-audit score					
Category	2012	2013	2014	2015	2016
Fatality Prevention	97	93	96	100	87
Confined Space Entry	97	94	97	96	83
Mobile Equipment Safety	94	94	97	100	67
Fall Prevention	94	94	97	96	77
Lock/Tag/Verify	97	97	100	96	75
Molten Metal Safety	71	81	79	88	65
Electrical Safety	91	81	91	96	83
Contractor Safety	100	94	100	100	83
Machine Safeguarding	77	90	97	100	-

A good rating is defined as meeting Alcoa and government standards. Percentages are rolling based on a location's most recent audit score in each focus area regardless of the year of the audit. Machine safeguarding was not scored in 2016 because this tool is now on a two-year audit cycle. It will be audited in 2017.

Related Information

[Health](#)

Health

Caring for people is a core value at Alcoa. We work to protect the health of our employees while they are in our facilities and empower them with tools, resources and support to live a healthy life.

Healthy Workplace

Our goal for a healthy workplace is simple—eliminate health hazards that could potentially affect employees, contractors and other individuals within our facilities. If elimination is not feasible, we work to reduce the risk to the fullest extent possible.

Guiding our efforts are internal 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](#).

“If it weren’t for the ‘Know Your Numbers’ testing at work, I never would have gone for bloodwork to check my cholesterol levels. I’m thankful for the annual testing, which will help me catch an issue early and address it. I also went for my first mammogram on the mobile breast center in 2016. I would have delayed this simply because of the inconvenience. When it was literally parked out front, I could not pass it up! I went in and was taken care of in a quiet, peaceful atmosphere and was back to work within a matter of minutes.”

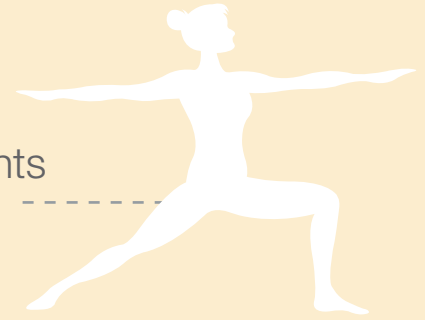


Dacia Fritchley
Human Resources Generalist
Alcoa Warrick Operations, USA

The health hazards inherent in our operations may include chemical, physical (noise, ergonomic, radiation, heat and vibration) and other types of hazards. Our locations have spent decades implementing processes, procedures,

2016 at a Glance

Thousands
of participants
in wellness
activities



equipment and technologies to mitigate these risks and have made significant progress as demonstrated by our [incident rates](#), which are well below industry averages.

Our most prevalent health hazard is noise due to the quantity, scale and nature of the equipment and processes used throughout our manufacturing operations. We have strict standards regarding the use of hearing protection and continually explore solutions for reducing noise and its magnitude. A number of our locations also have deployed testing technologies to measure the adequacy of hearing protection worn by employees. We plan to further expand this capability throughout 2017.

Our locations are actively working to eliminate or reduce noise. At our Intalco Works in the United States, for example, a noise assessment of the secondary water treatment plant found levels above exposure limits in some areas. A cross-functional team isolated the sources of the noise and experimented with different mitigation strategies. Actions included installing a muffler on a pump, placing rubber mats under equipment, re-wrapping pipe attachments and installing a noise curtain on a doorway. These actions resulted in a 15 percent reduction in noise exposure, lowering the levels enough that hearing protection is no longer required in the area.

Regardless of a location’s size, all employees have access to occupational medicine services to optimize their health and well-being. These services include regulatory or Alcoa-driven

chemical surveillance evaluations, fitness-for-duty assessments, hearing evaluations, lung-function testing, work-related injury and illness evaluation and treatment, substance abuse testing, job-related immunizations and wellness.

In 2016, we had 116 occupational disease cases reported among our workforce, with an occupational disease rate of 0.75 reported illnesses per 100 full-time employees. Reported illnesses can include respiratory disease, infections, skin disease, hearing loss, cancer, pneumoconioses and heat-related illnesses.

Occupational Disease Rate <i>Employees/supervised contractors</i>					
	Global	Australia	Europe	North America	South America
2012	0.51	0.76	0.07	0.83	0.15
2013	0.62	0.92	0.17	1.00	0.02
2014	0.80	0.90	0.38	1.38	0.06
2015	1.17	1.34	0.26	1.79	0
2016	0.75	1.13	0.13	0.99	0

The occupational disease rate represents the number of reported illnesses per 100 full-time workers. This rate is heavily influenced by the inclusion of non-instantaneous hearing-loss incidents, which represent a substantial contribution to the overall occupational disease rate.

Occupational Disease Rate <i>Non-supervised contractors</i>					
	Global	Australia	Europe	North America	South America
2012	0.11	0.34	0	0.10	0.10
2013	0.11	0.47	0	0.06	0.07
2014	0.04	0.23	0	0	0
2015	0.14	0.36	0.09	0.28	0
2016	0.06	0.21	0	0.07	0

Regional rates may fluctuate significantly year-over-year because of the relatively small number of disease cases identified overall.

Occupational Disease Count by Gender				
	Employees/Supervised Contractors		Non-supervised Contractors	
	Male	Female	Male	Female
2012	127	2	13	2
2013	141	7	12	1
2014	171	6	4	0
2015	216	6	11	1
2016	110	6	3	1

Employee Wellness

We take great pride in the progress we have made in creating a healthy workplace for our employees, but we believe it is also important to focus on improving overall employee health and well-being at both work and home.

Case Study

Preventing the Spread of the Zika Virus

In June 2016, more than 40 Alcoa volunteers from our Juruti mine in Brazil provided information and guidance on combatting the mosquito *Aedes aegypti*, which transmits dengue fever, chikungunya fever and the Zika virus, during a presentation to community members. Alcoa partnered with the School Council for Early Childhood and Primary Education on the event, which was held in the rural Boa Esperança community in Juruti.

Attendees learned about the dangers of water storage in their backyards and received guidance on how to keep their families safe. A mascot designed by Alcoans playfully conveyed the importance of prevention to children at the event.

Aedes aegypti is known as a container-breeding mosquito because it lays eggs in and around standing water.

Simple actions, such as collecting cups, cans, bottles, tires and other materials that can serve as a breeding space for mosquito larvae, contribute to combating disease.



Combating mosquito-borne illnesses

Initiatives in 2016 included the following:

- Our Get Moving awareness campaign provided tips, fitness challenges and other resources to help employees increase their daily physical activity.
- We offered discounted fees to encourage employees, family members and friends to participate in the worldwide Lighten Up weight-loss challenge, which was available in nine languages.
- Free onsite biometric screenings helped increase employee awareness of health status and identify potential health issues.
- Employees worldwide were offered a confidential heart-health assessment using the PROCAM health risk calculator, which is available in 15 languages.
- We offered employees a free online stress management program called meQuilibrium.

Thousands of employees took responsibility for their personal wellness by participating in one or more of our programs in 2016.

Related Information

[Safety](#)

Supply Chain

Our suppliers are important partners in our sustainability journey.

Our sustainability approach extends from cradle to grave, making it critically important for our suppliers and those who serve them to conduct business in a responsible, ethical and sustainable manner.

Our Global Supplier Sustainability Program allows us to assess and increase the sustainability of our key suppliers. These companies contribute the most to our carbon footprint, possess preferred status, are sole sources of supply, are located in emerging or high-risk countries, or provide regulated commodities.

The program consists of four components:

- **Communicate expectations:** We clearly define our sustainability expectations and communicate them through discussions and our [Supplier Standards](#).
- **Assess supplier:** We formally assess the performance of our key suppliers to evaluate the maturity of their sustainability programs and determine where improvements are needed.
- **Develop and educate:** For suppliers that fall into the emerging and lagging categories, we provide education and tools to develop and improve their programs. We also require action plans and demonstrated improvements in the development of their sustainability programs.
- **Monitor:** We reassess suppliers in the emerging and lagging categories annually. Those that do not demonstrate annual improvements face the risk of losing our business.

2016 Supplier Assessment Results

Percent of key suppliers

Leading	16
Active	66
Emerging	14
Lagging	4

2016 at a Glance

82% of suppliers were leading or active in sustainability



US\$7.8 billion in purchased goods and services

We continued implementing a third-party supplier due-diligence program to further manage risk in our supply chain related to the areas of anti-bribery and corruption, trade compliance, child and slave labor, criminal history, human trafficking and conflict minerals. At the end of 2016, more than 60 percent of our targeted suppliers were registered in the program.

We're also an active participant in the [Aluminum Stewardship Initiative](#), which will help us further embed sustainability into our supply chain.

Global Supplier Sustainability Program—Supplier Assessment Criteria

Supplier Sustainability Focus Area

Assessment Topics

Suppliers develop and implement a sustainability program that includes environmental, social, economic and ethical aspects; such programs are published publicly; suppliers cascade same to their supply base.

- Labor practices
- Health and safety programs
- Business ethics policies
- Community commitment programs
- Risk management (financial management and security of supply)
- Publicly disclosed policies and procedures
- Cascade principles and policies to supply base

Suppliers integrate sustainability into their business strategy and support it through their values and culture

- Value systems
- Participation in sustainability indexes or reporting frameworks
- Incorporation of sustainability into market strategy
- Live cycle advantages/disadvantages of key products

Suppliers measure performance and establish quantifiable environmental goals; progress on environmental goals publicly disclosed

- Environmental goals and metrics
- Recycling programs
- Measurement systems
- Public disclosure/third party assessment

Procurement Spend

In 2016, we purchased US\$7.8 billion in goods and services from thousands of suppliers around the world.

Related Information

- [Supplier Standards](#)
- [Ethics and Compliance](#)
- [Human Rights Policy](#)

2016 Spend by Region

Region	Procurement Spend <i>Billions of U.S. dollars</i>	Supply Base Composition <i>Percent of total supply base</i>
Australia	1.7	22
Europe	1.8	23
North America	3.2	41
South America	1.1	14
Total	7.8	100



Improving Our Footprint

Climate Protection

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

Carbon dioxide represents most of our greenhouse gas emissions, with our smelters the largest emitters of the gas. Through ambitious reduction goals, focused programs and the curtailment of high-emitting facilities, we reduced our carbon dioxide equivalent (CO_{2e}) emissions intensity by 36.9 percent between the 2005 baseline and 2016.

This result exceeded our targets of a 30 percent reduction in intensity by 2020 and 35 percent by 2030. In light of the achievement, we are reevaluating our greenhouse gas goals to drive further improvement.

“The engagement of Alcoa’s team members makes it possible to implement great projects that contribute to the achievement of sustainable development objectives. Energy efficiency is increased, emissions are reduced and productivity is improved. The Deschambault smelter’s long-term project planning, monitoring and ongoing follow-up conducted by the team make it possible for me to say that it is the most structured location in Québec.”

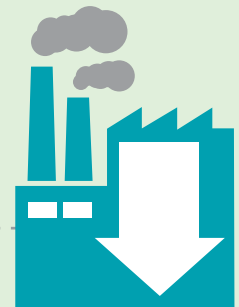


Guy Desrosiers,
Eng. CEM, CMVP
*Technical Advisor,
Major Industries
& Energy Efficiency
Gaz Metro*

Our total 2016 CO_{2e} emissions equaled 25.7 million metric tons, of which 17.7 million metric tons were direct emissions. This represents a 19 percent reduction in total emissions and a 12 percent decline in intensity compared to 2015. The main contributors to the year’s reductions were the recent closures of the Suralco refinery in Suriname and Anglesea power plant in Australia and the closure of the Warrick smelter and curtailment of the Point Comfort refinery in the United States. We also had reduced output at our Warrick power plant.

2016 at a Glance

19% reduction
in carbon
dioxide
equivalent
emissions



12% decline
in carbon
dioxide
equivalent
emission
intensity

5% of annual
variable
compensation
connected to
carbon dioxide
emissions
reduction



Our Scope 3 (supply chain) emissions in 2016 were 4.5 million metric tons of CO_{2e} for six categories—purchased goods and services; fuels and energy related activities; waste generated in operations; business travel; employee commuting; and transportation and distribution (downstream).

We engaged [First Environment](#) to provide limited third-party assurance on our 2016 carbon emissions data. The company's verification statement is available in the [appendix](#).

Carbon Dioxide Equivalent Emissions Intensity

Metric tons of CO_{2e} per metric ton of production

	Refining	Smelting (IPCC, 4th TAR)	Total (IPCC, 4th TAR)
2005 BASELINE	0.61	8.92	10.08
2012	0.55	6.55	7.61
2013	0.56	6.44	7.50
2014	0.55	6.42	7.46
2015	0.54	6.21	7.23
2016	0.54	5.34	6.36

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 84 percent of our total greenhouse gas 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). The phrase "4th TAR" stands for Fourth Technical Assessment Report. In accordance with guidance from the Greenhouse Gas Protocol developed by the World Resources Institute and World Business Council on Sustainable Development, we have removed from our data set emissions associated with locations that we have sold over the past several years.

Case Study

Targeting Anode Effects Reduces Greenhouse Gas Emissions

An effort to minimize anode effects at our Baie-Comeau smelter in Quebec, Canada, helped reduce the location's greenhouse gas emissions by 4.5 percent in two years despite a 5 percent increase in production. The reduction is equivalent to the annual emissions of 5,750 automobiles.

An anode effect is an undesired side reaction in a smelting pot that emits perfluorocarbons, a greenhouse gas with a [global warming potential](#) that is thousands of times greater than carbon dioxide. These effects are usually triggered by a decrease in the alumina concentration in the pot's molten bath, where aluminum is extracted from alumina through an electrolytic process.

Initiatives undertaken during 2015 and 2016 at our Baie-Comeau smelter included:

Carbon Dioxide Equivalent Emissions

Million metric tons

	Direct (Scope 1)	Indirect (Scope 2)	Total
2012	25.3	12.7	38.0
2013	25.2	11.6	36.8
2014	24.0	10.4	34.4
2015	22.8	8.8	31.6
2016	17.7	8.0	25.7

Of our 25.7 million metric tons of CO_{2e} in 2016, 24.4 million metric tons were associated with carbon dioxide, 0.070 million metric tons were associated with methane, 0.030 million metric tons were associated with nitrous oxide, 0.010 million tons were associated with SF₆ and 1.14 million metric tons were associated with perfluorocarbon (CF₄ & C₂F₆) emissions. There were no significant hydrofluorocarbon emissions. We had 2,200 metric tons of biogenic CO_{2e} emissions from the combustion of biodiesel. These emissions are not included in the total 2016 CO_{2e} emissions. Estimated indirect CO_{2e} emissions are those occurring at our purchased electricity and steam supplier facilities.

Climate Strategy

In 2016, we refined our climate strategy to encompass five pillars that reflect our challenges and opportunities after the separation from Alcoa Inc.

Reduction in Energy Consumption

The quantity of our greenhouse gas 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 and also improve the energy efficiency of our

- Optimizing pot control systems and process parameters to reduce the number and duration of anode effects.
- Adjusting the bath's chemistry, which keeps the alumina concentration within the correct range to optimize its distribution and solubility.
- Predicting anode effects. When computer monitoring identifies an increase in the frequency of certain conditions that could lead to an anode effect, the smelter's technical team checks the pot.
- Educating and engaging employees. After an anode effect occurs on specific operations, the technical team immediately meets with the operators to discuss the factors behind the incident.

Between 2014 and 2016, the smelter experienced a 78 percent reduction in anode effects. The achievement was a major factor in the location's 4.5 percent reduction in greenhouse gas emissions.

operations. A full discussion of our energy strategy can be found in the [Energy](#) section.

To engage our salaried managers and leaders, 5 percent of their annual variable compensation is connected to whether they make further carbon dioxide reductions through process upgrades and improved energy efficiency.

Carbon Reduction

While our businesses operated as part of Alcoa Inc., we made significant progress in reducing our carbon footprint through programs aimed at reducing specific greenhouse gas emissions, such as our successful 3 Million Ton Challenge for perfluorocarbon emissions. By mass, perfluorocarbons are the second most significant type of greenhouse gas emitted from our operations.

Curtailment or closure of facilities, some of which were among our highest emitters, also contributed to our emissions reductions.

To get to the next level of carbon reductions, we are increasing our focus on technology. We must first better understand the technological limits within our current operations and then develop new or deploy existing technology to help achieve our reduction goals.

Carbon Offsets and Credit Trading

Countries around the world are moving toward strengthened 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 are also working to better understand opportunities to offset our emissions through projects like the [United Nations' Reducing Emissions from Deforestation and Forest Degradation in Developing Countries \(REDD+\) program](#).

Products

We are developing greener products to help our customers deliver more sustainable products to society. A recent example is our new SUSTANA line of aluminum products, which we produce with low carbon emissions and recycled content.

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 aluminum and other lightweight materials to meet more stringent fuel-efficiency requirements.

Advocacy

Through industry associations and direct contact, we engage with global stakeholders on the issue of greenhouse gases to ensure fair and effective policies and regulations. These stakeholders include elected officials, government agencies and non-governmental organizations.

As an active member in the [Aluminum Stewardship Initiative](#), we are helping develop industry standards that include greenhouse gas emissions. We are also working through organizations like [European Aluminium](#), [International Aluminium Institute](#) and The [Aluminum Association](#) to inform the industry's approach to, and engagement on, carbon regulation.

In 2016, we directly engaged with government representatives, legislators, non-governmental organizations and other stakeholders in the U.S. state of Washington on a new clean air rule that caps and reduces carbon pollution. We educated these stakeholders on how we can contribute to the rulemaking, as well as the early actions we took at our Intalco and Wenatchee smelters in the state to reduce greenhouse gas emissions 75 percent and 48 percent, respectively, from a 1990 baseline.

Alcoa Foundation is also engaging with governmental and non-governmental organizations to advocate the prevention of, and resilience to, climate change. In 2016, the foundation provided funding to the Center for Climate and Energy Solutions to support a 2017 dialogue among negotiators and private-sector representatives to deepen the understanding of market needs and dynamics. This included seeking common ground on the implementation of market-related provisions of the [2016 Paris Agreement](#).

Related Information

[Energy](#)

Energy

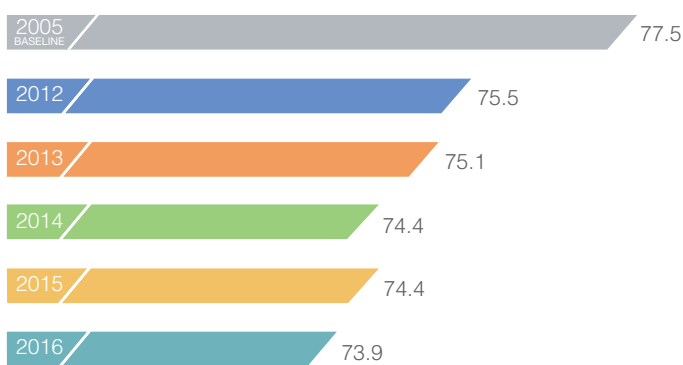
Energy is a critical resource for our operations, particularly our energy-intensive refining and smelting processes.

Securing low-cost, low-impact and long-term energy is a focal point of our energy strategy. We also reduce the amount of energy we consume through operational efficiency and technological advances, all of which lower our energy costs and reduce our greenhouse gas emissions.

Our sustainability target is a 10 percent reduction in energy intensity by 2020 and 15 percent by 2030 from a 2005 baseline. In 2016, we achieved a 4.6 percent intensity reduction against the baseline. Our overall energy consumption during the year declined by 80 million gigajoules, or 19 percent, compared to 2015.

Energy Intensity

Gigajoules per metric ton of aluminum produced



Energy intensity values reflect the net energy value after energy sold to the grid. Refining energy intensity is converted to 1 metric ton of aluminum at a ratio of 1.9 metric tons of alumina produced.

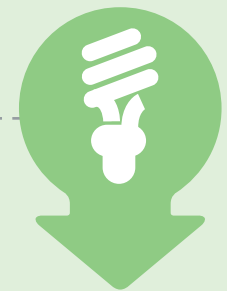
2016 Energy by Source

Source	Direct		Purchased Electricity	
	Gigajoules	Percent	Megawatt hours	Percent
Natural Gas	109,669,920	62	5,744,518	13
Hydro	0	0	26,668,244	60
Coal	54,625,037	31	7,040,263	16
Oil	11,005,313	6	110,614	0
Other Renewables	0	0	3,526,724	8
Diesel	2,823,239	2	111,833	0
Nuclear	0	0	1,556,187	3
Propane	47,512	0	0	0
Distillates	65,938	0	0	0
Local Grid	0	0	40,158	0
Total	178,236,959		44,798,541	

Percentages are rounded. Other renewables include geothermal, biomass, solar and wind energy

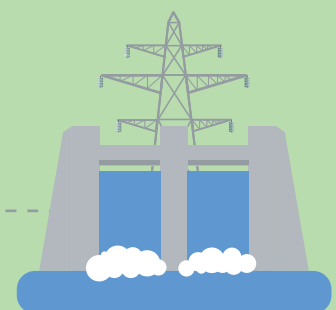
2016 at a Glance

1% decline
in energy
intensity



19% reduction
in energy
consumption

71% of
purchased
electricity
came from
renewable
sources



For energy consumption, we use the [Greenhouse Gas Protocol](#) developed by the [World Resources Institute](#) and [World Business Council on Sustainable Development](#) to establish boundaries and account for mergers, acquisitions, divestitures, startups 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.

[First Environment](#) provided third-party verification of our 2016 energy data. (View the [verification statement](#).)

“Alcoa is a leader in energy efficiency. The company’s three smelters in Québec, Canada, are Members of Distinction of our Energy Savers’ Circle, the highest recognition level available. Alcoa’s efforts clearly demonstrate its commitment to responsible and sustainable energy use.”

Hydro-Québec

Energy Security

Our portfolio of energy assets is composed of wholly-owned facilities and equity interests in consortiums. Our share of the generation capacity of these assets is 1.7 gigawatts, of which more than 60 percent is low-cost hydroelectric power. These assets provide us with operational flexibility and protection from fluctuations in the energy market so we can meet our internal energy requirements at the lowest possible cost. We also profit from selling our excess energy production to regional and wholesale markets. In 2016, we sold approximately 85 percent of the power we generated to these markets.

Our internal energy team supplements our self-generated power with approximately 4.4 gigawatts of purchased electricity for our smelters. More than half of this power is under long-term contracts that exceed 10 years.

In 2016, 71 percent of our purchased electricity was from renewable sources. Our smelters are our largest consumers

of energy globally, and renewable sources comprised 78 percent of their purchased electricity.

Our Canadian smelters in Deschambault, Baie-Comeau and Bécancour are supplied almost entirely with renewable energy. Hydroelectricity accounts for 100 percent of purchased energy used by our Alcoa Fjardaál smelter in Iceland and Massena location in the United States. Our Mosjøen and Lista smelters in Norway, both of which are certified to the ISO 50001 energy management standard, also use 98 percent hydroelectricity.

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 tap into 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, taking into account process variations from facility to facility.

Over the past few years, our refining operations implemented significant process improvements, setting the foundation for a forecasted system-wide energy efficiency record for 2017. Focus areas included process controls, heat transfer efficiency and maintenance improvements.

All of our smelters have realized efficiency improvements with the use of the SMART manufacturing platform. This system combines and displays various process information, allowing our employees to take actions that will conserve energy.

Technological Advances

Part of our heritage is 130 years of developing new technologies for the aluminum industry—including founding the industry itself.

Our experts 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 that would further transform the industry by improving energy efficiency and reducing carbon dioxide emissions.

Related Information

[Climate Protection](#)

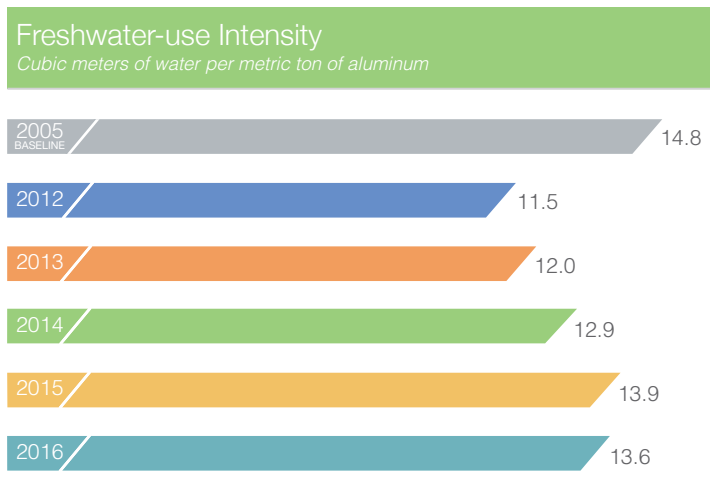
Water

Our facilities throughout the world rely on a sustainable supply of water.

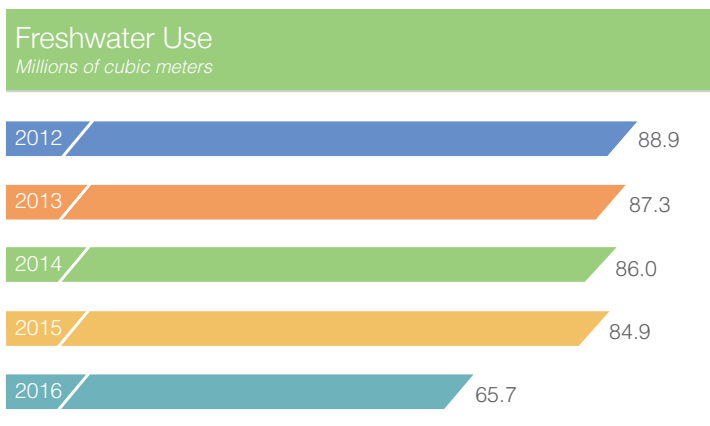
The largest users of water within our operations are our refineries and, to a lesser extent, our casthouses. Water is plentiful and a source of power for our smelters in some countries, such as Canada, Iceland, Norway and the United States. The situation is markedly different for our operations in Western Australia, where the drying climate is a challenge.

Despite these regional imbalances, we maintained a global goal in 2016 to reduce our average freshwater intensity by 25 percent by 2020 and 30 percent by 2030 from a 2005 baseline.

In 2016, our intensity was 8.1 percent lower than the baseline and 2.2 percent less than 2015. Factors behind this performance are primarily related to production curtailments in 2016.



Large volume, once-through water usage from our energy facilities is excluded from the intensity metric, which reflects only freshwater used to directly manufacture products. The total represents the combined impact of refining, smelting 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).



Rainwater not included.

2016 at a Glance

2% decline in freshwater-use intensity



65.7 million cubic meters of freshwater consumed

2016 Freshwater Withdrawal by Source

Source	Millions of Cubic Meters
Surface Water	43.4
Rainwater	25.6
Groundwater	19.0
Municipal Water	3.0
Wastewater	0.3

Data estimated based on water balance information and prior water surveys.

Strategic Water Management

We manage water consumption by understanding our requirements, the needs of the communities where we operate and the available resources to meet both.

We gain this understanding by periodically conducting a global water-risk survey that includes an assessment of local and regional water stress. These location assessments are cross-referenced with global assessments from the [World Business Council for Sustainable Development](#) and the [World Resources Institute](#) to verify potential areas of stress. We conducted our most recent survey in 2016.

At the plant level, we reduce consumption and discharge and increase recycling opportunities through advanced technologies and process improvements. In water-scarce Western Australia, we also use secondary sources of water and work to reduce the evaporation of stored water at our mines and refineries.

A good example of a technology with multiple benefits is residue filtration, which we commissioned at our Kwinana refinery in Western Australia in early 2016. With this technology, bauxite residue generated from the alumina refining process is forced through very large filters that squeeze out the water, which is recycled in the process. The system reduces the

refinery's freshwater use by 1.2 gigaliters (317 million gallons) annually and also reduces the volume of bauxite residue. We continue to evaluate the use of this technology at other refineries around the world.

“Water Corporation’s Water Efficiency Management Plan (WEMP) has been helping industry in Western Australia significantly reduce its water use since 2007.

Alcoa’s Pinjarra refinery was recognized by Water Corporation for its outstanding efforts, which led to a saving of over 50 percent in scheme water use since joining the program. It is encouraging Alcoa understands industry’s role in achieving community-wide water savings.”



Elise Matthews
Key Customer Engagement
Manager, Customer
& Industry Partnerships
Water Corporation

Case Study

Increasing Global Water Security

Our work to reduce water consumption and increase water security reaches beyond our own operations to encompass industries and governments around the world through our participation in [CDP’s water program](#) and Legacy Alcoa Foundation’s support of the initiative.



The program works to improve water security by engaging companies, investors and other stakeholders to act on water data disclosed by the world’s largest corporations and cities through CDP’s annual water questionnaire. In addition to gathering extensive and valuable water data, the questionnaire acts as a framework for corporate action and educates companies on best practices.

“Alcoa and its predecessor supported our efforts by both providing input as we developed our water-scoring

methodology and disclosing water data each year since the questionnaire was launched in the U.S. in 2012,” said Lance Pierce, president of CDP North America. “In addition, our long-standing partnership with Legacy Alcoa Foundation provided critical support as we developed the program and questionnaire.”

More than 1,400 companies worldwide disclosed their water data through the CDP water program in 2016. Their scores provide the world’s only holistic measure of corporate water performance, and they are shared each year with major investors and large purchasing organizations to enhance procurement decisions.

The collected data are also used in aggregate with other stakeholders, including policy makers, to promote a deeper understanding of water risks and impacts and encourage action to drive sustainable and equitable water use.

Waste and Emissions

Innovation and commitment have helped lessen our impact on the environment.

We closely manage the emissions and waste that we generate and continually look to eliminate them at their source, effectively control them in compliance with applicable laws or find alternative uses for them. Challenges remain, but we are committed to developing and pursuing technologies and processes that continue to shrink our footprint.

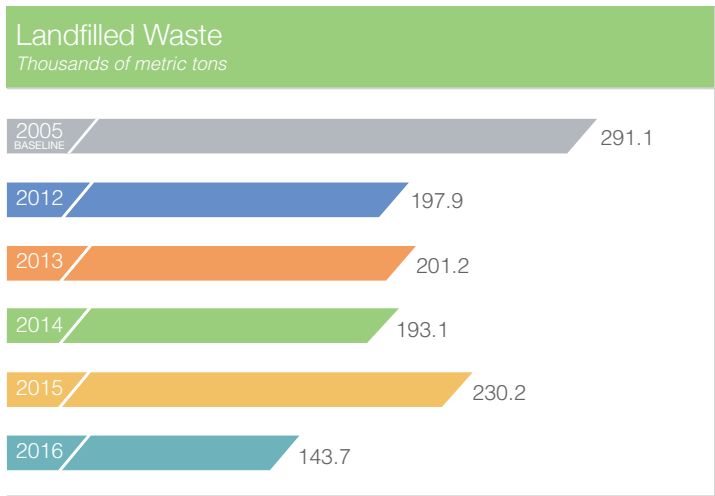
Landfilled Waste

Minimizing the waste we produce and finding alternative uses for what we do generate will help us achieve our strategic target, which for 2016 was a 75 percent reduction in landfilled waste by 2020 and 100 percent by 2030 from a 2005 baseline.

This goal excludes certain waste streams, such as bauxite residue and fly ash, since these would mask our progress on reducing landfilled waste. Overburden and rock generated from our mining activities are also not included since both materials are reused in mine rehabilitation and are not considered waste.

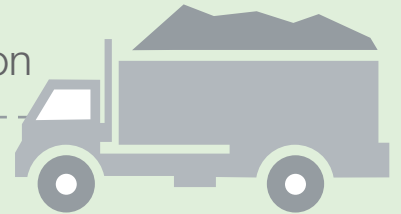
Our locations continued their efforts to reduce landfilled waste during 2016. At Alcoa Mosjøen in Norway, for example, an initiative to recycle bricks used in the anode factory reduced landfilled waste by 25 percent and disposal costs by US\$50,000 annually.

In 2016, our landfilled waste decreased 38 percent, primarily due to location curtailments and a slowdown in the quantity of spent pot lining treated at our Gum Springs facility in the United States. Since 2005, we have achieved a 51 percent reduction.



2016 at a Glance

38% reduction
in landfilled
waste



4%
improvement
in bauxite
residue
storage
efficiency



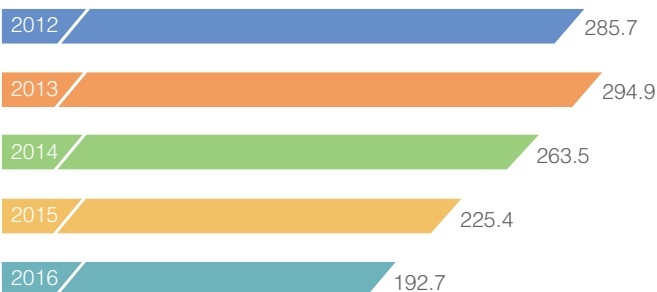
12% decrease
in mercury
emissions
intensity

EMISSIONS



Total Wastes Sold or Recycled

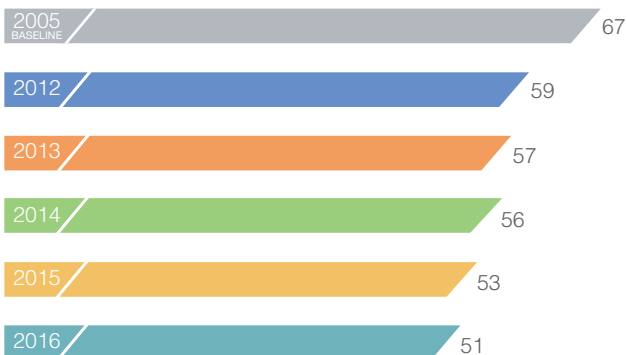
Thousands of metric tons



through very large filters that squeeze the water from the mud, with the water being recycled in the refining process. Because of the technology, the refinery will not need to construct another 30-hectare (74-acre) residue storage area for at least 20 years compared to every five years previously. The system also reduces freshwater use by 1.2 gigaliters (317 million gallons) annually. We are evaluating the use of this technology at our other refineries around the world.

Bauxite Residue Storage Efficiency

Square meters of land required per thousand metric tons of alumina produced



Bauxite Residue

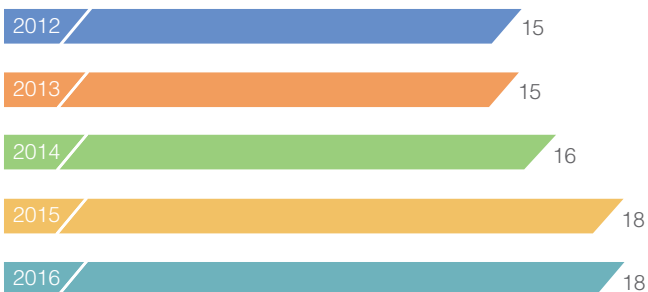
Generated during the alumina refining process, bauxite residue consists of coarse sand and mud, along with some residual caustic soda. It is stored in impoundments called residue storage areas that are capped and re-vegetated when full. In 2016, we generated 22.9 million metric tons of this residue.

Our 2016 strategic targets for bauxite residue focused on reducing the overall footprint associated with our management of the material:

- From a 2005 baseline, reduce bauxite residue land requirements per metric ton of alumina produced by 15 percent by 2020; 30 percent by 2030;
- Rehabilitate 30 percent of total bauxite residue storage area by 2020; 40 percent by 2030; and
- Recycle or reuse 15 percent of bauxite residue generated by 2020; 30 percent by 2030.

Bauxite Residue Storage Area Rehabilitation Rate

Percent of total area rehabilitated



We continued improving our bauxite residue storage efficiency in 2016 after meeting our 2020 goal in 2013—seven years ahead of schedule. Our rehabilitation rate remained steady, but challenges remained in meeting our residue recycle/reuse goal.

In early 2016, we commissioned an innovative technology known as residue filtration at our Kwinana refinery in Western Australia. With this technology, bauxite residue is forced

Bauxite Residue Recycled or Reused

Percent of total residue generated



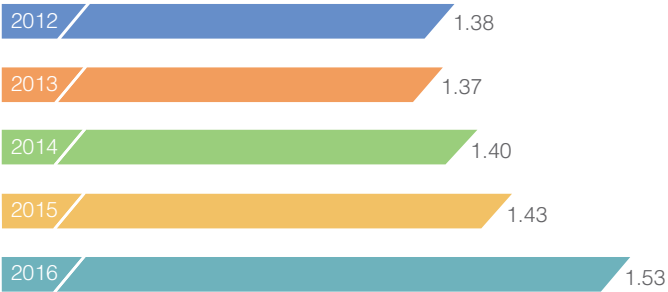
Due to the high volume of residue produced each year, the percent recycled or reused is minimal.



Stacking dry residue that results from the filtration process

Bauxite Residue Intensity

Metric tons per metric ton of alumina produced



The increase in 2016 was due to the curtailing of refineries that had lower residue-to-alumina ratios.

Residue Management

We have globally mandated standards involving the construction, management and maintenance of our residue storage areas. An independent civil engineering professional also conducts an annual review of the areas to ensure they are maintained and operated to our specifically mandated standards. This is in addition to operating within local, regional and federal standards.

In November 2015, a mining company's residue storage area in Brazil collapsed. We reviewed the findings from the incident and shared the lessons with all of our operating locations. We also engaged an independent consultant to conduct a detailed review of the design and ongoing monitoring of our highest-risk storage area in terms of potential consequences. The review uncovered no significant issues.

Another area of focus is improving how we close residue storage areas once they are full. While imported fill can be used to cap the areas, we have the capability to transform the residue into a viable soil layer that can sustain a vegetative cover and initiate a more natural remediation. Examples of our success can be found in our Australian operations. (See the [Land Management](#) section).

Residue Reuse

Our efforts to reuse bauxite residue have been slower than we would like despite our advancements in modifying the residue—particularly decreasing its alkalinity—to enhance its prospects for reuse. One major impediment is that no regulatory framework exists to assess bauxite residue for reuse in many of the countries where we operate refineries. We are working with various government bodies to create such a framework so innovations in our research pipeline can be approved much faster.

Despite that challenge, we have developed a number of products made from bauxite residue. Alkaloam[®], which is a fine-grained bauxite residue that is carbonated through a reaction with carbon dioxide, increases the pH of acidic soils almost instantly compared to years for agricultural lime. ReadyGrit[™] is a red-colored crushed rock material that can be used for general fill, construction backfill, turf top dressing, bunker sand and road bases. Bauxite residue is also used in the innovative Natural Engineered Wastewater Treatment (NEWT[™]) system developed by Alcoa Inc.

We continue to collaborate with external organizations and universities on residue reuse opportunities. Through Alcoa Foundation, for example, we are supporting research focused on using bauxite residue in the manufacture of cement, helping reduce that industry's greenhouse gas emissions and use of non-renewable raw materials.

Spent Pot Lining

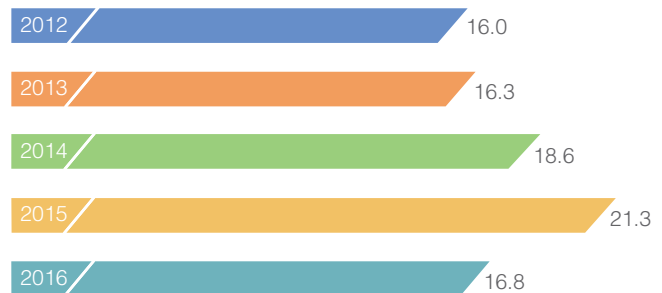
Spent pot lining is the carbon and refractory lining of smelting pots that have reached the end of their serviceable life.

Our approach to managing spent pot lining is to first minimize the volume we generate by using technology and processes to reduce pot failures and increase the lifespan of a smelting pot. Both result in fewer pots that need their lining removed and replaced.

We have been a leader in finding 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 is also a raw material used in the production of steel and a fuel source in the manufacture of rockwool insulation.

Spent Pot Lining Intensity

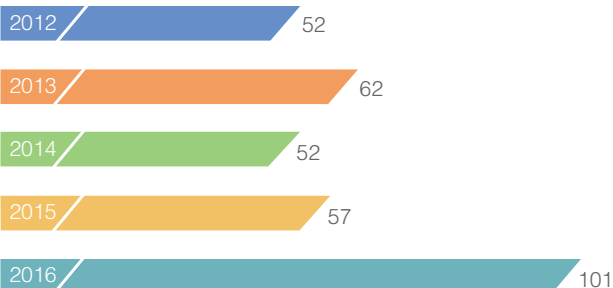
Kilograms per metric ton of aluminum produced



Intensity rates do not include demolition tonnage from permanently closed smelters. The increase in 2015 was due to less production as a result of smelter curtailments. The decrease in 2016 was the result of production curtailments and closures at several locations and the associated decrease in pot-rebuilding activities.

Spent Pot Lining Recycled/Reused

Percent of spent pot lining generated



Decreased recycling in 2014 was due to weakness in the cement industry and/or significant one-time remediation tonnage resulting from the permanent closure of several smelters for which recycling capacity was not available. Increased recycling in 2016 was the result of a focused effort to decrease the amount of spent pot lining in storage at several locations.

Coproducts and Byproducts Reuse

In addition to bauxite residue and spent pot lining, we are actively seeking alternative uses for our other [coproducts](#) and [byproducts](#) to avoid their disposal. In 2016, our recently formed secondary minerals team sold almost 125,000 metric tons of these products as raw materials or fuel sources for other industries.

Sample Coproducts and Byproducts

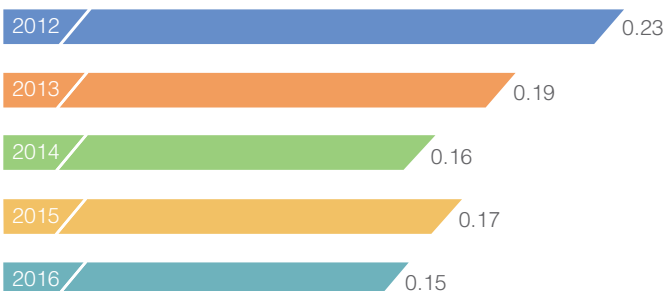
Product	Reuse
Bauxite residue	Neutralizer for acid soil, construction fill and road base material and wastewater treatment material
Spent pot lining	Fuel source and raw material for cement, steel, rockwool and other industries
Fly ash from coal-burning power plants	Cement additive
Secondary alumina (electrostatic precipitator dust)	Enrichment material for low-alumina ores or clays
Spent anodes	New anodes, fuel source and raw material for the steel and rockwool industries, raw material for chemicals and fuel source for cement industries
Excess smelting pot bath	Bath for new or existing smelting pots

Air Emissions

The manufacturing process used at a location determines the types of air emissions. Most greenhouse gas and fluoride emissions are from our smelting operations, while our refineries account for the majority of our mercury emissions. (See the [Climate Protection](#) section for a discussion on greenhouse gases.) We continue to work at a global level to reduce these and all emissions to industry benchmark levels.

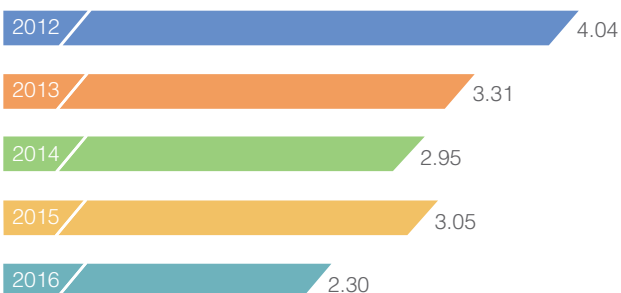
Mercury Emissions Intensity

Grams per metric ton of alumina produced



Mercury Emissions

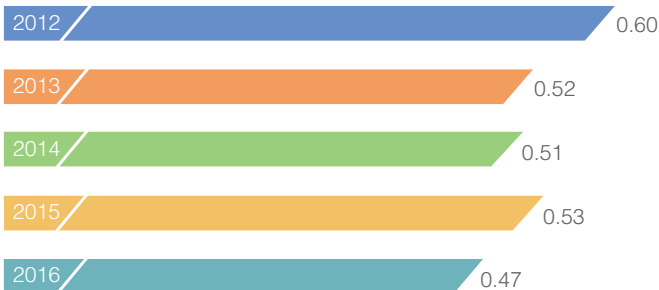
Thousands of kilograms



Crushing spent anodes

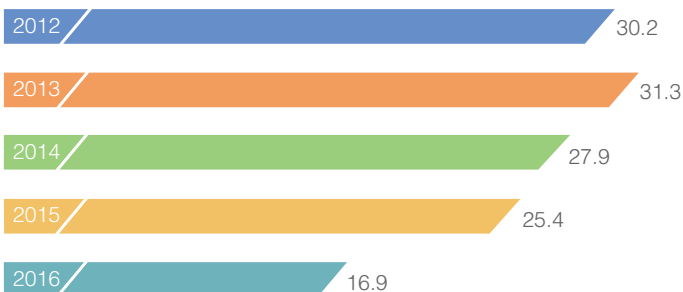
Fluoride Emissions Intensity

Kilograms per metric ton of aluminum produced



Nitrogen Oxide Emissions

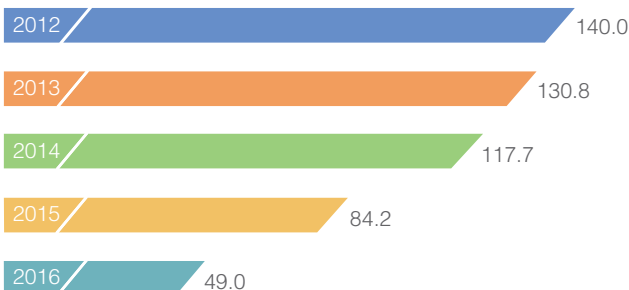
Thousands of metric tons



Significant decline in 2016 was due to facility curtailments.

Sulfur Dioxide Emissions

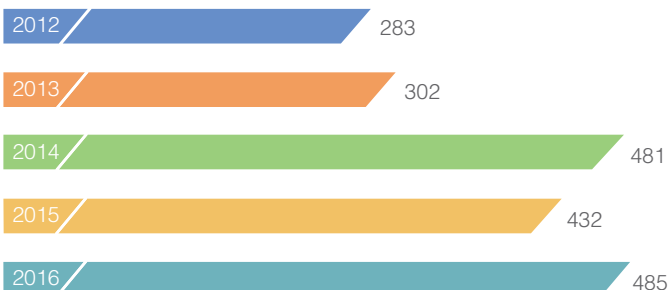
Thousands of metric tons



Significant decline in 2016 was due to facility curtailments.

Volatile Organic Compounds Emissions

Metric tons



Increase in 2016 was due to added production of rolled products within permitted levels.

Ozone-depleting Substances

We use halon gas as a fire suppressant in several locations throughout the world, and we are phasing out the remaining systems as they expire or are used. We have had no documented releases from a halon system since 2004.

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 we use to manage or minimize fugitive emissions from our mining and process operations include the watering of haul roads, storage piles and bauxite residue areas to suppress windblown dust. We also use capture and control systems for loading/unloading, material handling, aluminum reduction and other process operations. We frequently employ visual-emission observation and ambient-air monitoring as tools to verify the effectiveness of these controls.

Compliance

Our robust environmental compliance tracking system ensures we rapidly correct any actual or potential incident, such as a spill, that is not compliant with applicable environmental laws and regulations. We also use an environmental permit review process to ensure that permit applications, draft permits and final permits are effectively reviewed, commented on and submitted in accordance with regulatory requirements.

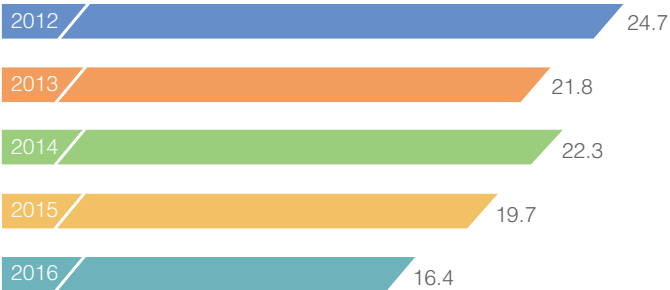
We encourage self-discovery and reporting of all deviations, no matter how small, so that we can learn from the event and continuously improve our compliance management system.

Spills

	Spills over 20 Liters	Major Spills
2012	417	8
2013	373	0
2014	452	0
2015	456	1
2016	318	0

We require any uncontained spill of oils or other process liquids in excess of 20 liters to be reported internally as an incident regardless of whether they are required to be reported to external agencies. 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.

Environmental Incident Rate



The environmental incident rate is the total number of reported spills over 20 liters and other reported environmental incidents, such as community complaints, divided by the total number of all Alcoa reporting locations. This rate includes all categories of incidents reported into the Alcoa Environmental Incident Management System with the exception of near misses, as they are seen as potential versus actual incidents.

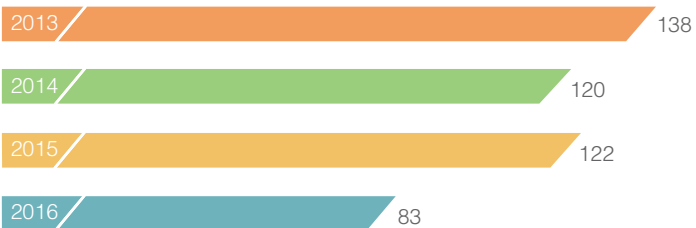
Environmental Capital Expenditures

Our capital expenditures for environmental purposes vary each year based on the number and type of projects implemented. In 2016, we invested US\$83 million in capital projects primarily focused on improving environmental control systems.

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



Data for 2012 are not available.

Related Information

[Climate Protection](#)

Land Management

We serve as stewards of the land, operating in a manner that focuses on minimizing our impacts and maximizing sustainable use.

Biodiversity

We endorse biodiversity conservation. Our approach is to minimize the disturbance of any original habitat and seek to avoid sensitive areas. Where areas are disturbed, we work to restore those lands to a productive use. This includes efforts to reestablish pre-operating conditions when feasible.

We've committed to not explore, mine or operate in [World Heritage](#) sites. We also seek to avoid designated protected areas, such as national parks or nature reserves, where strict nature conservation is the management objective. We endorse using land for more than one purpose where possible, having successfully operated bauxite mines, alumina refineries and aluminum smelters in sensitive native ecosystems.

Biodiversity impacts from our operations vary, and we implement industry-leading processes and techniques to mitigate disruption to vegetation, animals and natural resources. For example, mining bauxite requires shallow pits, haul roads and other infrastructure that result in the removal of native vegetation. We use progressive rehabilitation techniques to return this land to either a native state or other sustainable use.

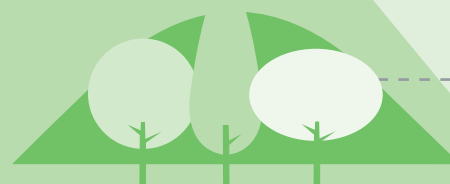
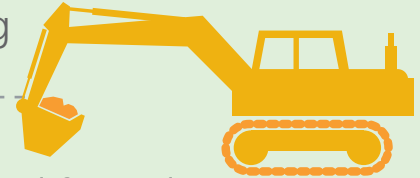
As an initial step, we have asked key locations worldwide to develop a biodiversity action plan that:

- Identifies the biodiversity values of the land, including sensitive habitats and the presence of threatened species and communities, in context with surrounding land;
- Pinpoints potential impacts, both positive and negative;
- Develops a range of strategies aimed at minimizing or mitigating biodiversity impacts;
- Informs our employees and communities where we operate about the importance of biodiversity protection, and encourage their participation in biodiversity initiatives; and
- Sets and reports performance against site-specific targets.

We have developed three plans (our mining operations in Western Australia, the Portland Aluminium smelter in Australia and the Juruti mine in Brazil) that are serving as models for our other locations to follow.

2016 at a Glance

4 active mines achieved or are close to achieving their minimum environmental footprint



14% decline in area disturbed for mining

US\$32 million spent on more than 70 remediation projects



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

Operational Site	Site Location & Size	Position	Biodiversity Value
Huntly and Willowdale mines (bauxite mines)	Jarrah Forest, Western Australia 712,900 hectares (1,761,614 acres)	Within protected area	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 (coal mine and power station that closed in August 2015)	Anglesea, Victoria, Australia 7,221 hectares (17,843 acres)	Within and adjacent to protected area	Adjacent land zoned for conservation and listed on the National Estate Register; threatened species and ecological communities (International Union for Conservation of Nature and federal government listed)
Wagerup refinery (alumina refinery)	Wagerup, Western Australia 6,000 hectares (14,826 acres)	Contains portions of area of biodiversity value	Ramsar listed wetlands adjacent; threatened species and ecological communities (International Union for Conservation of Nature and federal government listed)
Portland Aluminium smelter (aluminum smelter)	Portland, Victoria, Australia 500 hectares (1,236 acres)	Adjacent to protected area	Threatened species and ecological communities (International Union for Conservation of Nature and federal government listed)
Juruti mine (bauxite mine, railroad and port facility)	Juruti, Pará, Brazil 6,000 hectares (14,826 acres) that will be mined	Within protected area	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 area of biodiversity value	Fragmented native forests; threatened species (International Union for Conservation of Nature listed)
Paranam mine (bauxite mine that ceased operation in October 2015)	Paramaribo, Suriname 37,000 hectares (91,429 acres)	Adjacent to protected area	Adjacent to International Union for Conservation of Nature protected area; threatened species (International Union for Conservation of Nature listed)
Point Comfort refinery (alumina refinery that was curtailed in 2016)	Point Comfort, Texas, USA 1,417 hectares (3,501 acres)	Adjacent to protected area	Native grassland and intertidal emergent marsh (protected under the Clean Water Act); threatened species (International Union for Conservation of Nature and federal government listed)

Environmental Impact Assessments

Prior to constructing new facilities or expanding existing ones, we engage external consultants to conduct an environmental impact assessment to determine what, if any, impacts the project would have on the environment.

This thorough analysis documents the level of ecosystem and species diversity within the area of direct management control or significant influence using techniques, procedures and information generally accepted by the international scientific community as leading practices. We incorporate measures to minimize adverse impacts on ecologically significant ecosystems or species into the detailed design of the planned facilities. We give particular attention to the conservation of threatened species, critical habitats and unique floral and faunal communities.

Ecosystem Services

Ecosystem services are benefits obtained from natural ecosystems. These may be goods or raw materials, such as food, timber or freshwater. They also may be services carried out by ecosystems, including mitigation of climate impacts associated with human activity, 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; reclamation of mined land by providing seeds of native plants, naturally re-colonizing micro-organisms, flora and fauna; and restoration of ecosystem processes, such as nutrient, carbon and water cycles, that ensure long-term success.

Case Study

Mangrove Restoration Project Stimulates Ecosystem Community Engagement

Throughout a mangrove in Brazil, an entire ecosystem is returning.

An 18-month collaboration between the community, a university and Alcoa helped restore ecosystem services provided by a 1.3-hectare (3.2-acre) natural aquatic nursery and erosion control system in the region of Araçagi, São José de Ribamar, Maranhão.

With training by the Federal University of Maranhão, community members received compensation to collect, grow, plant and monitor the growth of more than 18,000 native seedlings in the once-degraded mangrove. They also provided alternative food to the existing crabs living in the mangrove so these crustaceans would not feed on newly planted seedlings.

Due to this work, monkeys, guarás (red birds) and fiddler crabs have returned to the restored area. The mangrove is also supporting the region's fishing and agricultural industries and minimizing silt buildup in the waterway caused by coastal erosion.

"I have lived here since I was born, and I never saw anything like this project," said Lourival Costa Silva, who owns a small restaurant and also works as a fisherman. "No one has ever planted trees in this mangrove, which is crucial to me since I can get shrimp, crabs and fish to

serve my clients. It is from this mangrove that I sustain myself and support my family's needs."

The project has stimulated community interest in environmental education, with residents establishing a local library and posting signs about mangrove preservation and proper garbage disposal. It also has empowered residents to serve as stewards of the land.

"Recently, there was a man who came to fish, but he forgot a piece of wood for his net," said Silva. "I told him I would lend him a piece of wood since there is a group taking care of the mangrove and people can't cut branches off of trees anymore. He apologized and went on his way with the wood that I gave him."



Mangrove after restoration

Our Juruti mine in Brazil was the site of a recent independent research project to develop, test and validate an ecosystem services-based framework to evaluate land rehabilitation in mining. Called the Ecosystem Services Approach to Rehabilitation (ESAR), the framework consists of four steps:

- Conducting an ecosystem services review;
- Developing a land reclamation plan;
- Monitoring ecosystem services; and
- Reviewing results.

The framework next will be tested at our mines in Western Australia.

Mine Rehabilitation

We believe mining is only a temporary use of the land.

Before operations commence at any of our mines, we engage with stakeholders to develop a rehabilitation plan to ensure that the site can be returned to conditions that will promote future sustainable use. In many cases, we strive to return the land to its natural state, such as forests, swamps 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 not only minimizing the land disturbed for mining, but also the amount disturbed for the long-term infrastructure needed to support mining activities, such as haul roads, rail lines and washing plants.

To achieve this, any excess land disturbed for mining is rehabilitated. Each mine also has a strategic management plan for



“When I visited Alcoa’s Juruti mine in Brazil, I thought I would only see the impact of the mine. Instead, it was much more. I saw an excellent revegetation system that is a good example of sustainability and impact reduction. I also saw a different form of social relationship. There is open dialogue and a great partnership between civil society, government, industry and youth—all thinking about how the city can grow properly. Juruti has a hopeful path ahead.”

Dr. Thomas Lovejoy
Professor, Environmental Science and Policy, George Mason University and Senior Fellow, United Nations Foundation

long-term infrastructure, committing to repurpose the buildings, haul roads and railroads. Areas that can’t be repurposed are rehabilitated.

We review the minimum footprint and long-term infrastructure plans annually and adjust as appropriate to reflect operational and other considerations.

During 2016, we had four active bauxite mining areas in Australia and Brazil and two active coal mines in the United States. 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 are not included in this sustainability report.

Four of our mines that were active in 2016 have achieved or are close to achieving their minimum environmental footprint. The Huntly mine in Australia is expected to achieve its target by 2020. We sold the Friendsville coal mine in the United States in July 2016.



A mature rehabilitated jarrah forest in Western Australia

Mining Land Disturbed/Land Rehabilitated

Hectares

	Open Mine Area Cumulative as of year-end	Area Disturbed Annual	Area Rehabilitated Annual
2012	14,815	1,104	1,197
2013	15,111	1,437	1,140
2014	15,632	1,414	1,008
2015	14,893	1,195	1,293
2016	15,283	1,028	646

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 annual land used in each reported year for mining or for mining infrastructure (e.g., roads, shops, crushing equipment, conveyors). Area rehabilitated means annual 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 succeeding year should be the open mine area from the preceding year plus any area disturbed and minus any area rehabilitated. Because the open mine areas are independently reviewed and corrected from time to time, this calculation utilizing the figures in the table above is unable to be applied precisely.

Open Mine Area

Hectares

	Australia	Europe/ Africa	North America	South America	Total
2012	4,468	0	1,091	9,256	14,815
2013	4,562	0	1,248	9,301	15,111
2014	4,804	0	1,261	9,567	15,632
2015	5,009	0	1,191	8,693	14,893
2016	5,351	0	1,128	8,804	15,283

Open mine area is the cumulative area of land that has not been rehabilitated, which includes active mines and land used for mining infrastructure.

North America data for all years include a total of 219 hectares (541 acres) of land at the inactive Squaw Creek coal mine in Indiana (USA), which has been rehabilitated but is awaiting the final phase of bond release. The entire Sandow coal mine in Texas (USA), which ceased production in 2006 and was fully reclaimed by 2010, has not been included in the open area measurements. Some areas of the Sandow mine are still pending final bond release, which we expect will be completed between 2017 and 2019. In Australia, the 2016 open mine area increased due to a range of operational constraints at the Huntly mine. Mined areas at the previous crusher region of McCoy remained open due to a strategy to eradicate potential infection of haul roads by the pathogen *Phytophthora cinnamomi*, which has the ability to kill many of the plant species in the jarrah forest. The backlog of open area is expected to be rehabilitated beginning in 2018 through to completion by 2020.

Area Disturbed for Mining and Associated Infrastructure

Hectares

	Australia	Europe/ Africa	North America	South America	Total
2012	680	0	94	330	1,104
2013	890	0	268	279	1,437
2014	818	0	179	417	1,414
2015	756	0	109	330	1,195
2016	631	0	51	346	1,028

Area disturbed means annual land used in each reported year for mining or for mining infrastructure (e.g., roads, shops, crushing equipment, conveyors). The decrease in disturbed area in North America in 2016 was largely due to the sale of the Friendsville mine in July 2016. In Australia, the 2016 decrease was due to a return to more normal rates following the relocation of the crusher operations for Huntly Mine.

Area Rehabilitated

Hectares

	Australia	Europe/ Africa	North America	South America	Total
2012	804	0	97	296	1,197
2013	796	0	111	233	1,140
2014	576	0	166	266	1,008
2015	550	0	179	564	1,293
2016	290	0	114	242	646

Area rehabilitated means annual land returned to natural conditions or to productive use (such as farming) after mining or decommissioning of mine infrastructure in each reported year.

The reduction in area rehabilitated in 2016 was mainly due to a range of operational constraints at the Huntly mine in Australia and reduced areas returned to the government of Suriname during 2016.

Rehabilitation Approach

The material excavated in our mining operations is typically made up of several layers that include topsoil (surface soil), overburden and bauxite ore or coal. The topsoil is an important resource, as it contains the seed and nutrient reserves essential for successfully establishing a sustainable vegetative cover after mining. The overburden also may contain valuable nutrients and microbes essential for the effective reestablishment of native vegetation.

We generally return overburden and any rock removed to access the bauxite ore and coal to the mine pits. Wherever possible, we relocate any removed topsoil and overburden to pits that recently have been filled or landscaped—a process called progressive rehabilitation. In some situations, it's not possible or practical to immediately return all of the topsoil or overburden to a mine pit. In these cases, we stockpile the materials for future management and rehabilitate these storage areas once they are no longer active.

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

Because biodiversity preservation is a major focus of our rehabilitation process, it's always a major component of any future land-use decisions or rehabilitation plans. To determine the biodiversity of our rehabilitated land, we routinely monitor tree establishment and growth, understory density and other parameters to determine the health of the vegetation. We also conduct periodic fauna re-colonization surveys, targeted

studies of rare or threatened fauna species and surface water and groundwater studies where applicable.

We apply many strategies to optimize the number of plant species we reestablish in rehabilitated areas. In addition to returning fresh topsoil, we spread collected and specially treated seeds and plant nursery-grown vegetation. We may use cuttings and tissue culture propagation techniques for species that generally don't produce viable seeds.

At our bauxite mines in the jarrah forest of Western Australia, we use tree trunks and stumps removed during clearing operations to construct fauna habitats in mining pits. While we previously placed a pile of three to five pieces of wood on each hectare of land, we now augment these log piles with specially selected single logs. Recent research indicates that recolonization by some reptiles, such as the Napoleon skink and marbled gecko, has improved. This is due to the shorter distances these small lizards must travel between habitats, reducing their exposure to predators.



Carefully selected logs with hollows and large cracks for animal habitats

Following two decades of trials at our Western Australia rehabilitation sites, we found that the establishment and longer-term survival of plant species could be improved through a reduction in the rate of fertilizer that we apply.

Case Study

Growth of a Community Partnership for Mine Rehabilitation

In communities surrounding the Juruti mine in the Brazilian Amazon, residents are actively engaged in collecting and growing native seeds and planting the seedlings as part of the mine's rehabilitation.

In November 2016, Alcoa signed a two-year contract with four community associations for the planting of seedlings grown in 76 community nurseries. The mine has been purchasing seedlings from community nurseries since 2008, with around 180 families now involved in seedling production.

During the contract, eight community members will work full-time for two months each year to plant approximately 50,000 seedlings on 172 hectares (425 acres) of mined land.

"This opportunity has been good for the communities, as it is generating income for many families," said Natanai Farias de Lima, who plants seedlings that include those produced by his wife. "Currently, the rehabilitation work at Alcoa is the main source of income for my family."

The program complements another Alcoa initiative, started in 2013, that focuses on conserving native clove

and rosewood species, which are nearly extinct due to centuries of unsustainable commercial harvesting. During the Juruti mine's construction, no clove trees were removed and only one rosewood tree had to be cut.

After an Alcoa-led initiative identified the remaining population of the two native tree species within the greater region, community members collected seeds and began producing high-value seedlings at the community nurseries. Once planted, each seedling is monitored on an annual basis by trained specialists.



Planting seedlings for mine rehabilitation

Benefits include an increase in the number of native plant species, a reduction in non-native species and no negative impact on growth rates of the native jarrah trees. Of particular significance were benefits for the survival and growth of difficult-to-return species that are typically grown in a nursery. We have implemented the change in fertilizer rates at both of our Western Australian mine sites.

Our Juruti mine in Brazil is recognized globally for its innovative rehabilitation. Most recently, it utilized the nucleation technique, which relies on locally adapted plants and animals colonizing micro-environments. This natural approach to rehabilitation is resulting in a more rapid and effective restoration of the disturbed areas.

These micro-environments are created by placing topsoil in mounds to create an undulating topography. This traps surface water and controls runoff in an area that sees an average of more than 300 millimeters (12 inches) of rain during each of the wet season months of January through May. Other aspects of nucleation include managing organic residue, such as tree stumps and brush piles, and creating specific shelter areas for wildlife and birds.



Nucleation technique

Impact on Indigenous Peoples and Traditional Populations

Our mining and other operations with the most direct impact on indigenous peoples and traditional populations are in Australia and Brazil.

In Australia, we've been associated with [Fairbridge](#) for more than 40 years. Through the Fairbridge Indigenous Sustainable Employment and Life Outcomes Initiative, at-risk indigenous youth are provided training in construction, conservation and management, outdoor recreation, hospitality and administration.

In Brazil, we've engaged with the traditional community of Juruti Velho, located at Vila Muirapinima, since the inception of our Juruti mine in the Amazon. Juruti Velho has a population of approximately 9,900 people (21% of the overall municipality of Juruti) and encompasses 56 communities located near where we started mining bauxite ore in 2009.

Since 2008, Alcoa, the National Institute of Colonization and Agrarian Reform (INCRA) and the Association of Communities of the Juruti Velho Region (ACORJUVE) have established a negotiation process on land use for mining and community. Federal and state district attorneys also have participated in the negotiations.

ACORJUVE is the formal organization that represents the Juruti Velho community, including landowner rights. From mine startup in October 2009 through December 2016, we paid approximately US\$15.7 million in royalties to ACORJUVE.

A comprehensive study to evaluate compensation for loss and damages was completed in late 2014. Since the results were not binding, we continued to negotiate with ACORJUVE, INCRA and the district attorneys throughout 2016 on the value of the compensation and method of payment.

Remediation

As science and technology advances, we adapt our manufacturing practices to minimize their impact on the environment. However, some of our historical operating practices, which were legal and acceptable in their time, have resulted in environmental issues. We are committed to remediating these sites so they can be repurposed to benefit the local community.

In 2016, we spent US\$32 million to address more than 70 remediation projects around the world. Many are at locations that are no longer operational but were once operated by us or a predecessor. Others have since been sold, but we retained the environmental liability.

The primary objective of any remediation project is the protection of human health and the environment. As part of this, we must first collect sufficient information using sound scientific assessments to understand the nature of the environmental condition. We also work to identify remedial solutions that are protective, feasible and economically sound. In addition, we must address the often-challenging objective of balancing multiple needs, desires and expectations within Alcoa, the community and regulatory authorities while keeping good science and constructability as key drivers in selecting a remedial approach.

We completed numerous large remediation projects in 2016. These included the clean-up of lead-impacted soil in a residential area in southern Illinois in the United States; the closure of former bauxite residue storage areas in western Illinois and St. Croix; and engineering work plan design for sediment and soil remediation in Texas (USA), Canada and Italy. We neared completion of a sediment remediation project in Norway, and we continued developing many other closure and remediation work plans for implementation over the next several years.

Facility Transformation

Whenever we close one of our facilities, we work closely with relevant stakeholders to develop a transformation strategy that positions the facility for reuse or redevelopment and continued value creation to the community. Some facilities can be repurposed with few changes. Others may require remediation, modification or even demolition before the land on which they are located can be reused.

Case Study

St. Croix Remediation Project Impacts Environment, Economy

An Alcoa-led remediation project on St. Croix in the U.S. Virgin Islands addressed an environmental issue and opened up 65 hectares (160 acres) of land for future redevelopment on an island with limited space for growth.

The site housed an alumina refinery that operated from 1965 to 2000. Alcoa World Alumina—part of the Alcoa World Alumina and Chemicals joint venture between Alcoa and Alumina Limited of Australia—and St. Croix Alumina jointly owned the facility for less than three years. Although the partners sold the property to the St. Croix Renaissance Group (SCRG) in 2001, they maintained liability for historical environmental issues.

In 2012, Alcoa began remediating a bauxite residue storage area, cooling pond and settling basin on the site using a design that could withstand a 500-year storm, such as a massive hurricane. Remediation included implementing storm water management controls, re-grading the area, adding layers of geotextile fabric, limestone rock, soil and compost, and planting native grasses and trees. The approximately \$20 million project primarily used local labor, materials, suppliers and contractors.

Alcoa is responsible for maintaining and monitoring the remediated areas through October 2018, after which SCRG will assume responsibility after approval from the Virgin Islands Department of Planning & Natural Resources (VIDPNR). SCRG plans to repurpose and redevelop the land as opportunities arise.

VIDPNR's Environmental Protection Division's Water Pollution Program worked with Alcoa over several years through various stages of the project—pre-design, design, permitting and remediation.

“We found Alcoa to be very responsive and proactive,” said Benjamin Keularts, environmental program manager, Water Pollution Program. “Alcoa showed a continued willingness to provide solutions and a commitment to ensuring that the work would protect the environment, as well as the residents of the USVI. There were various technical challenges that presented a number of issues that resulted in some setbacks and corrective action, but the overall project result remained exemplary.”

He adds, “VIDPNR hopes that during the ongoing maintenance and monitoring period, the project can prove itself to be just that—an example of remediation that is designed and built to protect the natural resources for years to come.”



St. Croix site before and after remediation



Our asset management policy covers the entire facility life cycle, including planning for end of life. Seventeen of our locations, some of which already have been closed, had management plans in place during 2016. Our long-term goal is to develop a plan for every location.

A major focus of our work in 2016 was decommissioning and remediating the 575-hectare (1,421-acre) Point Henry smelter and rolling mill complex in Australia, both of which we closed in 2014. Under the Point Henry 575 program, we worked with the community and other stakeholders to craft a [draft concept master plan](#) for the location's redevelopment that we released in October 2016. The plan envisions a mixed use redevelopment with numerous types of residential, commercial and recreational subdivisions. We're working with stakeholders to finalize the plan in 2017 while continuing to demolish the smelter and rolling mill equipment.

In 2016, we made the decision to permanently close the Suralco mine and refinery operations in Suriname. As part of our post-closure activities, we initiated a study to evaluate the creation of an industrial park within and adjacent to the existing refinery area to take advantage of the facility's infrastructure and utilities. We are working with the government of Suriname to determine the best approach to establishing an industrial center that optimizes the potential to attract new businesses that will benefit all stakeholders.

We completed demolition of our closed smelter facilities in Alcoa, Tennessee, and Frederick, Maryland, in the United States in 2016 and will complete final grading and remediation in 2017. Both locations, which total 1,084 hectares (2,679 acres), are being marketed for redevelopment and include numerous zoning designations.

We continued demolishing our closed Massena East smelter in New York, USA, and other closed smelters in Fusina, Italy, and Poços de Caldas, Brazil, during 2016.

We also worked with various stakeholders regarding our closed smelter in Portovesme, Italy, in support of the government's efforts to find a buyer to restart the operation. In parallel, we completed our work to define the environmental remediation and decommissioning plans that will prepare the location for redevelopment. We will begin the soil remediation program in 2017.



Awards

2016 Awards

Global

Dow Jones Sustainability Index (15th year)
Alcoa Inc.

Industry Leader (aluminum) and Gold Class Award—
RobecoSAM's Sustainability Yearbook
Alcoa Inc.

Most Admired Metals Company in the World—
Fortune Magazine
Alcoa Inc.

Duty of Care Award—International SOS Foundation
Alcoa Inc.

Australia

Employer of Choice for Gender Equality (15th year)—
Workplace Gender Equality Agency
Alcoa of Australia

Brazil

Company of the Year (non-ferrous metals category)—
Brasil Mineral Magazine
Alcoa Brazil

Social-Environmental Award—Chico Mendes Institute
Alumar (São Luís)

Best Social-Environmental Practices in 2016—
Benchmarking Brasil
Alumar (São Luís)

Golden Award (occupational hygiene category)—
Prêmio Proteção Brasil
Alumar (São Luís)

Excellence Award in the Brazilian Metallurgic and Mining
Industry (processes category)—
Minérios & Minerales Magazine
Juruti Mine

50 Biggest and Best Companies of Minas Gerais—
MercadoComum Magazine
Poços de Caldas

Spain

Down Lugo Award—Down Lugo Association
Alcoa San Ciprián

United States

Corporate Equality Index 2017 (top score of 100)—
Human Rights Campaign Foundation
Alcoa Inc.

Best Place to Work for LGBT Equality—
Human Rights Campaign Foundation
Alcoa Inc.

2016 Straight for Equality in Workplace Award—PFLAG
Alcoa Inc.

GRI Index

Global Reporting Initiative Content Index

This index helps readers compare the information from our sustainability report, annual report and website with the [Global Reporting Initiative GRI Standards](#).

This report is in accordance with the “core” option of the GRI Standards.

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
102-3	Location of headquarters	New York City, USA
102-4	Location of operations	Locations
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
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	Alcoa Corporation was formed in 2016 upon the separation of Alcoa Inc. into two companies.
102-11	Precautionary Principle or approach	Alcoa supports the precautionary principle under the United Nations Global Compact. 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
102-15	Key impacts, risks, and opportunities	Opportunities and Challenges Sustainability Strategy
Ethics and Integrity		
102-16	Values, principles, standards, and norms of behavior	Alcoa Values Human Rights Policy Code of Conduct Business Conduct Policies 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	Directors Board Committees
102-19	Delegating authority	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 sustainability and human resources have responsibility for environmental and social topics.
102-21	Consulting stakeholders on economic, environmental, and social topics	Public Issues Committee Stakeholder and Community Engagement
102-22	Composition of the highest governance body and its committees	Directors Board Committees
102-23	Chair of the highest governance body	2017 Proxy Statement (page 11) The chairman of the board at the end of 2016 was Michael G. Morris.
102-24	Nominating and selecting the highest governance body	Governance and Nominating Committee
102-25	Conflicts of interest	Governance and Nominating Committee Corporate Governance Business Conduct Policies Related Person Transaction Approval Policy 2017 Proxy Statement (pages 23-30)
102-26	Role of highest governance body in setting purpose, values, and strategy	Public Issues Committee Audit Committee Officers
102-27	Collective knowledge of highest governance body	Public Issues Committee Audit Committee
102-28	Evaluating the highest governance body's performance	The Board of Directors annually assesses the effectiveness of the full board, the operations of its committees and the contributions of director nominees.

GRI 102 General Disclosures 2016

Disclosure	Description	Location
Governance		
102-29	Identifying and managing economic, environmental, and social impacts	Public Issues Committee Audit Committee
102-30	Effectiveness of risk management processes	2017 Proxy Statement (page 28) Public Issues Committee Opportunities and Challenges
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 five to six times annually.
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.
102-33	Communicating critical concerns	Stockholders and employees can communicate any concerns to Alcoa's Board of Directors through: <ul style="list-style-type: none"> • Regular mail, addressed to Chairman of the Board, c/o Alcoa Corp., Corporate Secretary's Office, 390 Park Avenue, New York, NY 10022-4608, USA; • Regular mail, addressed to Audit Committee, c/o Alcoa Corp., Corporate Secretary's Office, 390 Park Avenue, New York, NY 10022-4608, USA; • Integrity Line; • Stockholder resolutions; • Stockholder recommendations for director nominees; • Stockholder 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	2017 Proxy Statement (pages 40-44)
102-36	Process for determining remuneration	2017 Proxy Statement (pages 39-69)
102-37	Stakeholders' involvement in remuneration	2017 Proxy Statement (pages 37-38)
Stakeholder Engagement		
102-40	List of stakeholder groups	Stakeholder and Community Engagement
102-41	Collective bargaining agreements	Annual Report (page 27)
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

GRI 102 General Disclosures 2016

Disclosure	Description	Location
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 103 explains the principles of consolidation, and pages 191-193 include a list of 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	Not applicable
102-49	Changes in reporting	Alcoa Corporation was incorporated in March 2016 in preparation for the separation of Alcoa Inc.
102-50	Reporting period	2016
102-51	Date of most recent report	Not applicable
102-52	Reporting cycle	Annual
102-53	Contact point for questions regarding the report	Rosa Garcia Piñeiro Vice President, Sustainability
102-54	Claims of reporting in accordance with the GRI Standards	Core option
102-55	GRI content index	GRI Index
102-56	External assurance	Reporting and Materiality

Material Topics

Disclosure	Description	Location
GRI 201: Economic Performance 2016		
201-1	Direct economic value generated and distributed	Economic Value
201-2	Financial implications and other risks and opportunities due to climate change	Opportunities and Challenges Climate Protection
201-3	Defined benefit plan obligations and other retirement plans	Annual Report (pages 141-149)
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

Material Topics

Disclosure	Description	Location
GRI 302: Energy 2016 (<i>continued</i>)		
302-5	Reductions in energy requirements of products and services	Sustainability Strategy
GRI 303: Water 2016		
303-1	Water withdrawal by source	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	Land Management
304-2	Significant impacts of activities, products, and services on biodiversity	Land Management
304-3	Habitats protected or restored	Land Management
304-4	IUCN Red List species and national conservation list species with habitats in areas affected by operations	Land Management
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
305-5	Reduction of GHG emissions	Climate Protection
305-6	Emissions of ozone-depleting substances (ODS)	Waste and Emissions
305-7	Nitrogen oxides (NOX), sulfur oxides (SOX), and other significant air emissions	Waste and Emissions
GRI 306: Effluents and Waste 2016		
306-2	Waste by type and disposal method	Waste and Emissions
306-3	Significant spills	Waste and Emissions
GRI 403: Occupational Health and Safety 2016		
403-2	Types of injury and rates of injury, occupational diseases, lost days, and absenteeism, and number of work-related fatalities	Safety Health Absentee rates are not provided due to the information not being collected and compiled on a global basis. We do not anticipate reporting this information in the near future.
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

Disclosure	Description	Location
MM1	Amount of land (owned or leased, and managed for production activities or extractive use) disturbed or rehabilitate	Land Management
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	Land Management
MM3	Total amounts of overburden, rock, tailings, and sludges and their associated risks	Waste and Emissions
MM4	Number of strikes and lock-outs exceeding one week's duration, by country	There were zero strikes or lockouts in 2016.
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	Land Management
MM6	Number and description of significant disputes relating to land use, customary rights of local communities and indigenous peoples	Stakeholder 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 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 2016.
MM10	Number and percentage of operations with closure plan	Land Management



Appendix

Safety Data

Fatalities

Employees and supervised contractors/non-supervised contractors

	Global	Australia	Europe	North America	South America
2012	1/0	0	0	1/0	0
2013	0/0	0	0	0	0
2014	0/1	0	0	0/1	0
2015	2/1	0/1	0	2/0	0
2016	0/1	0	0	0	0/1

Fatalities by Gender

Employees and all contractors

	Male	Female	Total
2012	1	0	1
2013	0	0	0
2014	1	0	1
2015	3	0	3
2016	1	0	1

Fatal and Serious Injuries/Illnesses

Employees and supervised contractors

	FSI Actuals (Events resulting in a fatal or serious injury/illness)	FSI Potentials (Near-miss events)	Total FSI Events
2014	11	666	677
2015	4	636	640
2016	4	265	269

A serious injury/illness is any incident that is life-threatening or life-altering. We began formally tracking FSIs in 2014.

Days Away, Restricted and Transfer Rate

Employees and supervised contractors

	Global	U.S. Manufacturing Average	Australia	Europe	North America	South America
2012	0.63	2.4	1.45	0.10	0.60	0.17
2013	0.47	2.2	1.10	0.10	0.48	0.14
2014	0.47	2.2	0.80	0.21	0.55	0.06
2015	0.38	2.2	0.45	0.26	0.46	0.15
2016	0.30		0.56	0.20	0.23	0.11

The 2016 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
2012	147	15	162
2013	108	10	118
2014	82	7	89
2015	56	3	59
2016	30	1	31

Days Away, Restricted and Transfer Rate

Non-supervised contractors

	Global	Australia	Europe	North America	South America
2012	0.10	0.92	0.30	0.34	0.26
2013	0.16	0.94	0.28	0.77	0.18
2014	0.21	0.86	0.17	0.34	0.10
2015	0.25	0.54	0.28	0.33	0.08
2016	0.22	0.07	0	0.29	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
2012	48	2	50
2013	45	7	52
2014	23	4	27
2015	20	1	21
2016	16	1	17

Lost Workday Rate

Employees and supervised contractors

	Global	U.S. Manufacturing Average	Australia	Europe	North America	South America
2012	0.14	1.1	0.53	0.03	0	0.09
2013	0.16	1.0	0.44	0.10	0.08	0.10
2014	0.15	1.0	0.41	0	0.10	0
2015	0.14	1.3	0.25	0.03	0.12	0.11
2016	0.17		0.32	0.10	0.11	0.11

The 2016 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
2012	53	1	54
2013	48	2	50
2014	41	3	44
2015	34	0	34
2016	30	2	32

Total Recordable Incidents by Gender

Employees and supervised contractors

	Male	Female	Total
2012	437	29	466
2013	391	21	412
2014	406	30	436
2015	302	16	318
2016	234	23	257

Lost Workday Rate

Non-supervised contractors

	Global	Australia	Europe	North America	South America
2012	0.04	0.29	0.30	0.20	0.07
2013	0.04	0.21	0.09	0.13	0.06
2014	0.07	0.29	0.09	0.14	0
2015	0.11	0.18	0.19	0.22	0
2016	0.10	0.07	0	0.07	0.15

Total Recordable Incident Rate

Non-supervised contractors

	Global	Australia	Europe	North America	South America
2012	0.03	1.69	0.60	0.88	0.59
2013	0.32	1.99	0.28	0.84	0.50
2014	0.69	1.71	0.52	1.08	0.51
2015	0.77	1.56	0.75	0.72	0.50
2016	0.68	0.97	0.32	0.81	0.61

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.

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
2012	18	0	18
2013	11	1	12
2014	8	1	9
2015	9	0	9
2016	5	1	6

Total Recordable Incidents by Gender

Non-supervised contractors

	Male	Female	Total
2012	129	6	135
2013	96	8	104
2014	69	8	77
2015	61	4	65
2016	45	3	48

Total Recordable Incident Rate

Employees and supervised contractors

	Global	U.S. Manufacturing Average	Australia	Europe	North America	South America
2012	1.28	4.3	2.63	0.27	1.36	0.42
2013	1.25	4.0	2.23	0.49	1.49	0.43
2014	1.55	4.0	1.92	0.59	2.23	0.33
2015	1.34	3.8	1.27	0.77	1.88	0.34
2016	1.32		1.48	0.92	1.65	0.46

The 2016 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.

First Environment Limited Assurance Verification Statement

Verification Statement

Alcoa Corp
390 Park Avenue
New York, NY 10022

First Environment performed a verification of emissions sources contained in Alcoa Corp's (Alcoa) 2016 GHG Inventory, as represented to First Environment in "Final_2016_GHG_Inventory_040417.xlsx" and "Scope 3 Summary_2016 Emissions_draft5. xlsx," and Alcoa's total energy consumption as represented to First Environment in "GHG IS Fuel Data Pivot_2016.xlsx" and "Purchased_Electricity.xlsx." The GHG Inventory and associated energy consumption total were prepared by representatives of Alcoa and submitted to First Environment for assessment.

The scope of the GHG Inventory is as shown in Table 1:

Table 1: Alcoa's GHG Inventory Scope

Organizational Boundaries	Operational/Financial Control
Geographic Boundaries	Global
Operational Boundaries	Scope 1, 2, and 3 emissions
Reporting Period	EY2016
Included Greenhouse Gases	CO ₂ , CH ₄ , N ₂ O, PFCs, and SF ₆
Included Metrics	Total reported energy consumption
Reported Scope 1 and 2 Emissions	25,659,828 tCO ₂ e*
Reported Energy Consumption	178,236,959.55 GJ 44,798,541 MWh

*Reported Scope 2 emissions are quantified using "location-based" methods.

The specific Scope 3 emission categories, sources, and total emissions reported by Alcoa are shown in Table 2:

Table 2: Alcoa's Scope 3 GHG Assertion Details

Emissions Category	Included Scope 3 Emission Sources	Reported Emissions (MTCO₂e)
Category 1: Purchased Goods and Services	Goods purchased in excess of 40,000 MT	2,715,710
Category 3: Fuel and Energy Related Activities	Includes purchased fuels for all Alcoa business units that are available in the Alcoa Global Environmental Metrics Systems. Excludes upstream emissions from electricity generation.	1,676,373
Category 5: Waste Generated in Operations	Waste generation and transport from all Alcoa aluminum smelters	7,310
Category 6: Business Travel	Business travel (air) for North America and Australian employees	3,348
Category 7: Employee Commuting	North American and Australian employees	23,127
Category 9: Downstream transportation and distribution	Truck and rail transportation for North American locations	91,065

Reported Scope 3 emissions are comprised of emissions of CO₂, CH₄, N₂O.

All reported emissions are quantified using the global warming potentials from the IPCC Fourth Assessment Report.

Verification Statement

Verification Objectives

The primary objective of the verification process is to provide Alcoa with an independent opinion of veracity of the GHG and energy consumption data presented in its GHG Inventory for the emission year 2016. Based on this statement, Alcoa is seeking a confirmation that the 2016 GHG Inventory is in conformance with the specified criteria and accurate relative to specified materiality thresholds for the purposes of assuring internal confidence for voluntary public reporting.

Reporting and Verification Criteria

The GHG inventory was prepared and assessed using the following criteria:

- Basis of Preparation & Procedures, Alcoa Corp 2016 Energy Consumption and Greenhouse Gas Emissions (Scope 1 and Scope 2), 7 April 2017
- 2016 Basis of Preparation & Procedures, Scope 3 Emissions

As informed by:

- The Greenhouse Gas Protocol: A Corporate Accounting and Reporting Standard (Revised Ed.) including Required Greenhouse Gases in Inventories, Accounting and Reporting Standard Amendment, February 2013 and GHG Protocol Scope 2 Guidance, 2015
- The Aluminium Sector Greenhouse Gas Protocol (Addendum to the WRI/WBCSD Greenhouse Gas Protocol), October 2006
- Corporate Value Chain (Scope 3 standard) Accounting and Reporting Standard (WRI WBCSD), September 2011
- Technical Guidance for Calculating Scope 3 Emissions, a companion document to the Scope 3 Standard, Version 1.0, 2013

The verification was performed consistent with ISO 14064, Part 3: *Specification with guidance for the validation and verification of greenhouse gas assertions*.

The definition of materiality for the verification process was as follows:

- A material misstatement is a discrepancy in total Scope 1 and 2 emissions of greater than five percent.
- A material misstatement is a discrepancy in total reported energy consumption of greater than five percent.
- A material misstatement is a discrepancy greater than ten percent in any Scope 3 emissions category.

Verification Methods

The verification process consisted of a strategic review of the entire inventory, followed by review of a risk-based sample of historical evidence of source emissions estimates. Interviews during a site visit at Alcoa's corporate headquarters with staff responsible for data collection and the administration of centralized data management systems also informed First Environment's emissions assessments. The effectiveness of the data management system and its controls were tested through assessment of database outputs and tracing of reported activity data to physical records. The results of these evaluations were used in the preparation of First Environment's estimates of Alcoa's emissions. First Environment's estimates were compared against Alcoa's total reported emissions and energy consumption considering both the GHG Inventory's conformance to the requirements of the criteria, as well as its overall accuracy.

Level of Assurance

The level of assurance for the verification was to provide limited assurance of the assertions' accuracy and adherence to specified reporting criteria.

Verifier Independence

First Environment was not responsible for preparation of any part of the GHG inventory. First Environment confirms that we are not aware of any issue that could impair our objectivity in relation to this verification engagement.

Verification Statement

Conclusion

Based on the results of the verification activities performed, First Environment concludes, with limited assurance, that no evidence was identified to suggest reported emissions in Alcoa's 2016 GHG inventory as represented in "Final_2016_GHG_Inventory_040417.xlsx" and "Scope 3 Summary_2016 Emissions_draft5. xlsx," and Alcoa's total energy consumption as represented to First Environment in "GHG IS Fuel Data Pivot_2016.xlsx" and "Purchased_Electricity.xlsx" are not materially correct.

This verification statement is provided on the Eighteenth of April, Two-thousand and seventeen.

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A handwritten signature in blue ink, appearing to read "Michael M. Carim".

Michael M. Carim, Lead Verifier

A handwritten signature in black ink, appearing to read "James Wintergreen".

James Wintergreen, Independent Internal Reviewer



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