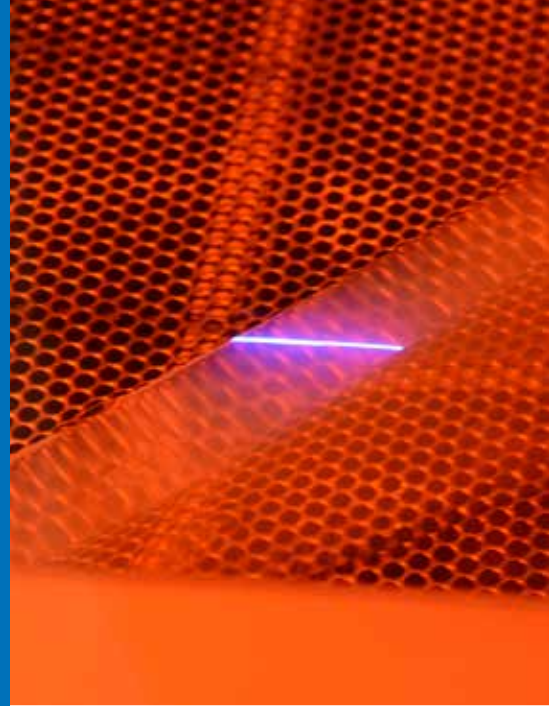
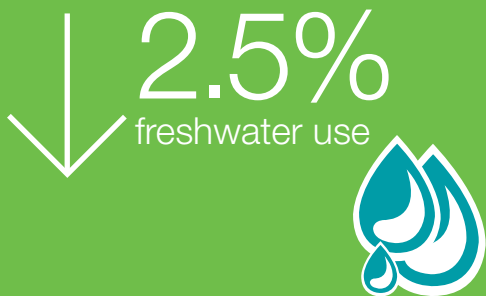
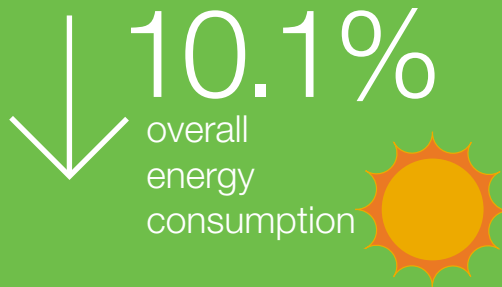
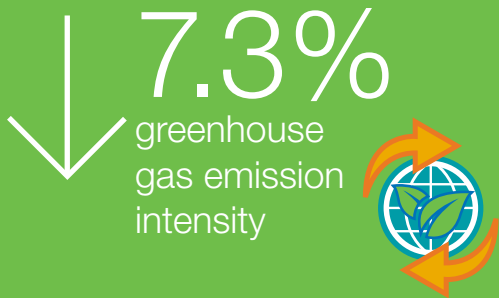




2015 Alcoa Sustainability Report



2015 Sustainability by the Numbers



5
fatalities



0.31
days away,
restricted, and
transfer rate



Chief Executive Officer Statement

2015 was a pivotal year in Alcoa's multi-year transformation. We exited high-cost commodity assets to further reduce our cost position. We continued investing in markets, such as aerospace and automotive, where our innovation edge gives us tremendous profitable growth opportunities. And we took the next step to unlock the full value of our powerful portfolio—announcing the separation of Alcoa into two independent publicly-traded companies, an Upstream company, which will operate as Alcoa, and a Value-Add company, which will be named Arconic.

As we prepare to launch two strong companies in the second half of 2016, we remain laser-focused on helping our customers drive toward a more sustainable future while improving our own environmental performance.

Our future Value-Add business, Arconic, will be a leader in markets such as aerospace, automotive, commercial transportation, and building and construction. Our customers need products and technologies that improve efficiency, save energy, and conserve resources—without compromising performance. This intersection is where we excel...

- **We power efficiency in the skies:** Our high-performance materials are found on virtually every aircraft, spacecraft and jet engine flying today. High-performance castings, specialized rings, and forged fan blades are key enablers of the next generation of jet engines. Our aluminum-lithium alloys are up to 7% less dense than the current generation and can lower the weight of next-generation aircraft applications by up to 10% versus composite structures.
- **We're light weighting automotive:** We are at the forefront of building light, strong, aluminum-intensive vehicles for decades, and last year the aluminum-auto revolution hit U.S. shores when the nation's highest selling vehicle went aluminum-intensive. Built with Alcoa's military-grade aluminum, the new F-150 truck is 317 kilograms (700 pounds) lighter than its predecessor, saving 4.6 metric tons of carbon dioxide emissions during each truck's lifetime. But we didn't stop there—our Micromill™ materials, which are 30% lighter and twice as formable as their steel counterparts, will debut on this year's truck.
- **We're building a greener future:** We create thermally efficient architectural aluminum systems that help improve building energy-efficiency by up to 50%. Our state-of-the-art framing and wall systems are also hurricane- and blast-resistant, making buildings more resilient and increasing occupant safety.

Our future Upstream company, the new Alcoa, has continued to improve its cost position, and, at the same time, reduce its environmental footprint. It has long been recognized for its commitment to sustainable bauxite mining and rehabilitation, emissions reduction, and resource management practices. As a cost-competitive industry leader in bauxite, alumina, and aluminum, we are the partner of choice for sourcing sustainably produced aluminum for industries, such as consumer electronics, packaging, automotive, and aerospace. In 2015, we launched a new range of patented specialty alloys to further address light weighting in the automotive industry.

In 2015, Alcoa reduced absolute greenhouse gas emissions by another 5.5 million metric tons. We continue to reduce our environmental footprint with innovative technologies like residue filtration, which will reduce the amount of land required to store residue and save approximately 1.2 gigaliters of water annually at our Kwinana refinery in Australia.

With the support of the Alcoa Foundation, we contributed to infectious disease prevention in Guinea in the wake of the 2015 Ebola outbreak. In addition, this year marked the fifth year of Alcoa Foundation's participation in American Forests' "Partnership for Trees" program. As part of Alcoa's "Ten Million Trees" by 2020 initiative, Alcoa Foundation and American Forests have planted more than 1.1 million trees globally in 50 communities where Alcoa has a presence.

When Alcoa launches two new companies in the second half of 2016, both will carry forward the values that have made this company great for 127 years—a continued drive to improve our handprint through innovation, and an ongoing commitment to sustainability across our global footprint.



A handwritten signature in dark ink, appearing to read 'Klaus Kleinfeld', written in a cursive style.

Klaus Kleinfeld
Chairman and Chief Executive Officer

Chief Sustainability Officer Statement

Our sustainability story in 2015 was one of significant achievement overshadowed by our failure to send five people home safely.

Four employees and one contractor were fatality injured during the year, the most since 2008. We know we can operate fatality-free, as we demonstrated between 2012 and 2014 when we had zero fatalities for 811 consecutive days.

As Alcoa prepares to launch two strong companies in the second half of 2016, the safety of our employees and contractors remains a top priority. We are committed to maintaining a fatality-free workplace moving forward.

Protecting the environment is another area of significant importance to Alcoa. In 2015, we progressed against our goal of a lower carbon future by:

- Achieving our 2020 greenhouse gas intensity target five years ahead of plan by reducing our absolute greenhouse gas emissions by 5.5 million metric tons in 2015 and improving our greenhouse gas emission intensity by 31.3% from our 2005 baseline.
- Obtaining, for the first time, limited assurance on our Scope 3 greenhouse gas emissions. This led to Alcoa being named to the Standard and Poor's 500 Climate Disclosure Leadership Index.
- Quantifying the carbon avoidance achieved through the use of more than 85% of our products.
- Signing the [American Business Act on Climate Pledge](#), one of the first companies to do so.
- As part of that pledge, committing to reduce our absolute U.S. greenhouse gas emissions by 50% versus a 2005 baseline and also demonstrate a net reduction of greenhouse gas emissions from the use of our products equal to three times the emissions created by their production—all by 2025.

We will meet the latter goal through our inherently sustainable products, which offer lighter weight, save energy, and, subsequently, reduce greenhouse gas emissions. In 2015, for example, we introduced a lightweight, all-aluminum commercial truck frame still under development that will reduce truck weight by more than 40% compared to steel frames for increased fuel efficiency.

As the pages of this report show, we advanced against many of our sustainability targets during the year and expanded others related to our products' contribution to decarbonizing the world.

During 2015, we improved our bauxite residue storage efficiency and rehabilitation rate. We finalized biodiversity action plans for three of our locations, and we minimized our

global mining footprint. We further embedded sustainability into our supply chain, and we increased diversity in our professional and executive ranks. All of these achievements led to Alcoa being included in the Dow Jones Sustainability North America Index for the 14th consecutive time and again named the aluminum industry leader on the Dow Jones World Index.

When Alcoa launches two new companies in the second half of 2016, both will continue using our innovation, creativity, and passion to deliver net-positive benefits to the environment, communities where we operate, our employees, and our shareholders.

Kevin McKnight

Chief Sustainability Officer and Vice President of Environment, Health, and Safety



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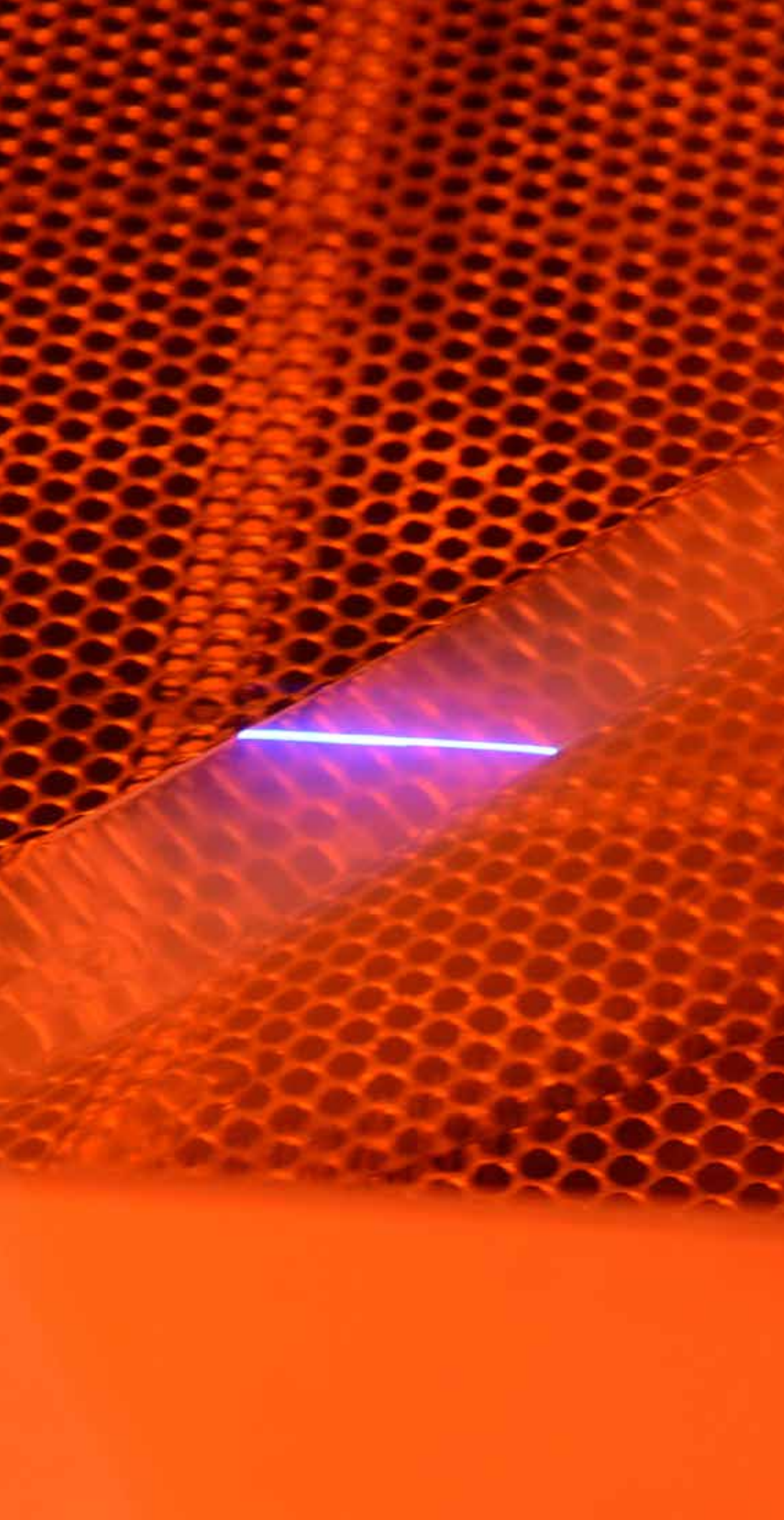
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Forward-looking Statements

Certain statements in this report 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, supply/demand balances, and growth of the aerospace, automotive, and other end markets; statements regarding targeted financial results or operating performance; statements about Alcoa’s strategies, outlook, business and financial prospects, and the acceleration of Alcoa’s portfolio transformation; and statements regarding the separation transaction, including the future performance of the two independent companies if the separation is completed, the expected benefits of the separation, the expected timing of completion of the separation, and the expected qualification of the separation as a tax-free transaction. 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) uncertainties as to the timing of the separation and whether it will be completed; (b) the possibility that various closing conditions for the separation may not be satisfied; (c) failure of the separation to qualify for the expected tax treatment; (d) the possibility that any third-party consents required in connection with the separation will not be received; (e) the impact of the separation on the businesses of Alcoa; (f) the risk that the businesses will not be separated successfully or such separation may be more difficult, time-consuming or costly than expected, which could result in additional demands on Alcoa’s resources, systems, procedures and controls, disruption of its ongoing business and diversion of management’s attention from other business concerns; (g) material adverse changes in aluminum industry conditions; (h) deterioration in global economic and financial market conditions generally; (i) unfavorable changes in the markets served by Alcoa; (j) the impact of changes in foreign currency exchange rates on costs and results; (k) increases in energy costs; (l) 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 and increasing revenues and improving margins in its Global Rolled Products, Engineered Products and Solutions, and Transportation and Construction Solutions segments) anticipated from restructuring programs and productivity improvement, cash sustainability, technology advancements (including, without limitation, advanced aluminum alloys, Alcoa Micromill, and other materials and processes), and other initiatives; (m) 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; (n) political, economic, and regulatory risks in the countries in which Alcoa operates or sells products; (o) the outcome of contingencies, including legal proceedings, government or regulatory investigations, and environmental remediation; (p) the impact of cyber attacks and potential information technology or data security breaches; (q) the potential failure to retain key employees while the separation transaction is pending or after it is completed; (r) the risk that increased debt levels, deterioration in debt protection metrics, contraction in liquidity, or other factors could adversely affect the targeted credit ratings for the two proposed independent companies; and (s) the other risk factors discussed in Alcoa’s Form 10-K for the year ended December 31, 2015, and other reports filed with the U.S. Securities and Exchange Commission (SEC). 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.

To provide feedback on Alcoa’s sustainability report, please send an e-mail to sustainability@alcoa.com or complete our [online survey](#).



Advancing Our Vision

We strive to achieve a net-positive result between our impacts and the sustainable value our innovations create for customers, consumers, and the world.

Sustainability Strategy

Integrating Sustainability into Business Strategies

- Alcoa business leadership is responsible for the integration of sustainability into our business strategies.
- We launched the Net Positive initiative to better capture the value our lightweight metal products and solutions bring to customers and society.
- Progress against long-term sustainability targets is linked to annual variable compensation.

At Alcoa, we define sustainability as using our Values to build financial success, environmental excellence, and social responsibility in partnership with all stakeholders.

We integrate sustainability into our core business strategy using a multi-layered structure:

- The **Executive Council** is accountable for setting annual targets and measuring progress against those targets, as well as longer-term goals;
- The chief sustainability officer is responsible for developing a comprehensive strategy that integrates all of the businesses' sustainability efforts;
- Business leaders are responsible for the integration of sustainability into their respective business practices; and
- Internal sustainability experts in each region and business around the world implement the strategy and processes.

We are committed to regularly reviewing our strategy and performance, and we have been setting goals and publicly reporting our results against them since 1993. Our objective is to be transparent with respect to our sustainability issues and progress and to provide significant information to all of our stakeholders.

In 2009, we developed a new set of long-term goals and objectives to drive progress in our businesses by 2020 and, for some areas, by 2025 or 2030. We use these strategic sustainability targets to monitor our progress against key focus areas, which include energy efficiency, emissions, and waste.

Sustainability scorecards measure progress against our near-term sustainability targets and seamlessly integrate sustainability concepts into our business processes. The scorecards allow our businesses to focus on key targets that align with their overall business strategy and facilitate dialogue between business and corporate leadership on progress against those targets.

In addition to the scorecards, each business has developed a roadmap to achieve longer-term (2020) sustainability goals. The Roadmap to 2020 clearly lays out the process steps, business decisions, and technical improvements necessary year-by-year for a business to achieve its longer-term objectives.

While we have always been focused on reducing our impacts—and will continue to make that a priority—we believe there are additional opportunities to better capture the value our lightweight metal products and solutions bring to customers and society through reduced energy consumption and greenhouse gas emissions in the use phase.

Throughout 2015, we worked to quantify this value by comparing our impact (footprint) and the benefits that we provide to our customers and society (handprint). This Net Positive initiative focused on developing a repeatable methodology to calculate the positive greenhouse gas benefit we enable on an annual basis. We intend to further incorporate handprinting into our sustainability strategy throughout 2016. (See the Net Positive section.)

To ensure the integration of sustainability into our core business strategies, our chief executive officer has

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Sustainability Indices**
In Collaboration with RobecoSAM

championed pay for performance to achieve specific sustainability objectives. During 2015, up to 20% of our variable compensation was tied to achieving significant aspects of our sustainability targets. Across the entire workforce, the targets focused on safety and reductions in carbon dioxide emissions. Our management-level employees had an additional target to improve the diversity of our workforce. See the Our People section for additional details and 2015 results.

We were recognized in 2015 for our sustainability efforts through inclusion in the Dow Jones Sustainability North America Index for the 14th consecutive time. We were also named the aluminum industry leader on the Dow Jones World Index.

In September 2015, we announced a plan to separate into two companies—a globally competitive Upstream company and a Value-Add company consisting of our midstream and downstream businesses. (Read the [press release](#).) The separation is expected to occur in the second half of 2016, and we will develop separate sustainability strategies and targets for each company.

Related Information

- Strategic Sustainability Targets section ([page 8](#))
- Reporting & Materiality section ([page 10](#))
- Net Positive section ([page 17](#))

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Strategic Sustainability Targets

Driving Optimal Performance through Strategic Targets

- Strategic targets for our businesses and locations integrate all aspects of sustainability into day-to-day operations.
- In 2015, we introduced two targets related to our climate strategy to reinforce our commitment to reduce greenhouse gas emissions.

In 2000, an internal worldwide team analyzed environmental and social trends since 1990 and looked 20 years into the future to develop Alcoa's 2020 Strategic Framework for Sustainability. That framework has since evolved into a set of strategic targets for our businesses and locations to integrate all aspects of sustainability into their day-to-day operations.

We continuously review and update our targets to ensure that we are providing appropriate stretch goals for our businesses. In 2015, we introduced two additional greenhouse gas targets to help fulfill our commitment as one of the first U.S. companies to sign the [American Business Act on Climate Pledge](#):

- Reduce our absolute U.S. greenhouse gas emissions by 50% versus a 2005 baseline by 2025; and
- Demonstrate a net reduction of greenhouse gas emissions from the use of our products equal to three times the emissions created by their production by 2025.

We modified our leverage ratio goal because we believe that debt-to-adjusted earnings before interest, taxes, depreciation, and amortization is more indicative of the financial strength of our company than is debt-to-capital. We also eliminated our recycling rate goal for used beverage cans since it is a target that we cannot control unilaterally due to several external factors. However, we continue to support industry and non-governmental organization efforts to increase recycling rates around the world. (See the Recycling section.) In addition, we eliminated the goal focused on implementation of the Alcoa Community Framework since 2015 data were not collected from the locations due to our plan to separate into two companies in 2016.

During 2015, we developed an approach and methodology to measure the positive greenhouse gas impacts of our downstream products in the use phase. (See the Net Positive section.) Our previous targets did not capture those advantages, and we anticipate further target refinement in 2016.

The following shows the progress we achieved through 2015 against our existing and new targets.

Strategic Sustainability Targets

Targets	Progress Achieved through Year-end 2015
From a 2005 baseline, a 30% reduction in total (direct and indirect) carbon dioxide equivalent intensity in Global Primary Products (refining and smelting) by 2020; 35% by 2030.	31.3%
Reduce our absolute U.S. greenhouse gas emissions by 50% versus a 2005 baseline by 2025.	46%
Demonstrate a net reduction of greenhouse gas emissions from the use of our products equal to three times the emissions created by their production by 2025.	To be reported on beginning in 2016
From a 2005 baseline, a 10% reduction in the energy intensity of Global Primary Products by 2020; 15% by 2030.	4.2%
A 20% reduction in the energy intensity of Global Rolled Products from its 2005 baseline by 2020; 30% by 2030.	18.5%
From a 2010 baseline, a 20% reduction in the combined energy intensity of Engineered Products and Solutions and Transportation and Construction Solutions by 2020; 30% by 2030.	23.0%
From a 2005 baseline, a 25% reduction in average freshwater-use intensity by 2020; 30% by 2030.	13.2%
From a 2005 baseline, a 75% reduction in landfilled waste by 2020; 100% by 2030.	13.9%
Rehabilitate 30% of total bauxite residue storage area by 2020; 40% by 2030.	18%
Recycle or reuse 15% of bauxite residue generated by 2020; 30% by 2030.	0%
Develop biodiversity plans for 34 key locations by 2015.	Three plans completed
Zero fatalities.	Four employee fatalities and one contractor fatality in 2015
A total recordable incident rate of 0.68 by 2020; 0.19 by 2030.	1.08

Targets	Progress Achieved through Year-end 2015
In 2015, achieve the following representation at Alcoa's executive level: <ul style="list-style-type: none"> • Global women: 22.3% • U.S. minority: 16.9% 	Global women: 22.8% U.S. minority: 16.8%
40% of employees volunteer in the community through ACTION, Bravo!, Month of Service, or Alcoans in Motion.	ACTION: 41% Bravo!: 42% Month of Service: 47% Alcoans in Motion: 17%
Debt-to-adjusted earnings before interest, taxes, depreciation, and amortization ratio between 2.25 and 2.75.	2.80

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Reporting & Materiality

Continuing a Tradition of Transparent Reporting

- Many of our top leaders and employees in regions around the world are involved in our sustainability reporting.
- We conducted an internal analysis to determine how the material aspects may differ between our upstream and value-add businesses.
- Our material sustainability aspects include greenhouse gas emissions, energy, water, health and safety, economic performance, and local communities.

The Alcoa 2015 Sustainability Report, which continues our long history of reporting on our economic, environmental, and social performance, is designed to give stakeholders access to detailed and current information on our sustainability efforts.

Building upon a foundation of accountability and transparency, the report shows how sustainability is integrated into all aspects of our company. In addition, it serves as a teaching tool for our internal and external stakeholders and drives best practices throughout our company.

Many of our top leaders and employees around the world are involved in the writing of individual sections of our sustainability report, or they provide significant input and feedback. In addition, the draft report is provided to the [Public Issues Committee](#) of the Alcoa Board of Directors and our [Executive Council](#) for review.

Unless otherwise noted, the information contained in this report covers all global operations where Alcoa has a majority interest and/or management control. This information is supplemented by other Alcoa reports and documents, including the [annual report](#); [regional sustainability reports](#); [U.S. Securities and Exchange Commission filings](#); and the extensive [alcoa.com](#) website. One report cannot tell the whole Alcoa story, which is why we encourage stakeholders to review all of our information resources.

Stakeholder Inclusiveness

The needs, expectations, and concerns of our various stakeholders—both internal and external—are key factors in determining the overall content and specific material aspects (significant economic, environmental, and social impacts) of our sustainability reporting. An explanation of how we identify and engage with stakeholders on an ongoing basis can be found in the Stakeholder Engagement section.

Stakeholder input for our 2015 reporting was obtained in a variety of ways, including:

- Feedback on our 2014 reporting that was gathered via an ongoing survey throughout 2015;

- Engagement at the location level through the implementation of the Alcoa Community Framework and review of community stakeholder surveys;
- Identification of major stakeholder issues from current and past years (see charts in the Stakeholder Engagement section); and
- Ongoing media coverage of Alcoa.

Materiality

Increased interest from stakeholders, including non-governmental organizations (NGOs), customers, our supply chain, and regulatory bodies, requires that we employ a robust process to determine the most important factors driving both risk and opportunity.

We report in accordance with [Global Reporting Initiative guidelines](#) to structure the report and also determine and prioritize content. However, determining materiality today requires assimilation of many perspectives and inputs. As such, we incorporated the following broad stakeholder and other input to determine relevant aspects:

- Results from our stakeholder engagement, including annual stakeholder surveys;
- Ongoing and structured internal assessment of our risks and opportunities (a discussion of the significant risks can be found in our [Form 10-K](#) for the year ended December 31, 2015);
- Our strategic sustainability targets, which were developed by our senior management and focus on our most significant sustainability challenges;
- Customer feedback from our annual Net Promoter Score survey process;
- Direct dialogue with global NGOs;
- Our business strategy;
- Insights of our senior management and industry organizations; and
- Issues evaluated by external organizations, such as the Dow Jones Sustainability Indices and the Carbon Disclosure Project.

In September 2015, we announced a plan to separate into two companies—a globally competitive Upstream company and a Value-Add company consisting of our midstream and downstream businesses. (Read the [press release](#).) In preparation for the separation, which is expected to occur in the second half of 2016, we conducted an internal analysis

Material Aspects—Upstream Business

Material Aspect	Internal Boundary	External Boundary
Greenhouse gas emissions	All global operations where we have financial and operational control	Government agencies, communities surrounding our operating locations, and NGOs
Energy	All global operations where we have financial and operational control	None
Health and safety	All global operations where we have financial and operational control	Government agencies focused on health and safety in each country in which we operate and communities surrounding our operating locations
Economic performance	All global operations where we have financial and operational control	Shareholders, lenders, financial analysts, investors globally, and communities surrounding our operating locations
Effluents and waste	All global operations where we have financial and operational control	Government agencies, communities surrounding our operating locations, and NGOs
Local communities	All global operations where we have financial and operational control	Communities surrounding our operating locations and NGOs
Biodiversity	All global operations where we have financial and operational control	Government agencies, communities surrounding our operating locations, and NGOs

of how the material aspects for our Upstream and Value-Add businesses may differ.

Our chief sustainability officer and members of his team evaluated and prioritized the relevant aspects and determined the following for our Upstream and Value-Add businesses for the 2015 report.

Material Aspects—Value-Add Business

Material Aspect	Internal Boundary	External Boundary
Greenhouse gas emissions	All global operations where we have financial and operational control	Government agencies, communities surrounding our operating locations, and NGOs
Energy	All global operations where we have financial and operational control	None
Health and safety	All global operations where we have financial and operational control	Government agencies focused on health and safety in each country in which we operate and communities surrounding our operating locations
Economic performance	All global operations where we have financial and operational control	Shareholders, lenders, financial analysts, investors globally, and communities surrounding our operating locations
Water	All global operations where we have financial and operational control	Government agencies, communities surrounding our operating locations, and NGOs
Local communities	All global operations where we have financial and operational control	Communities surrounding our operating locations and NGOs
Products and services	All global operations where we have financial and operational control	Customers
Training and education	All global operations where we have financial and operational control	None

In addition to reporting on these material aspects, we continue to provide relevant information on many other topics to meet the needs of our diverse stakeholders.

Report Quality

This report was developed in accordance with the following Global Reporting Initiative principles for defining report quality.

Balance

The report presents a balanced view of our sustainability performance, with both positive and negative aspects discussed. The five years of data in most charts also allow stakeholders to see trends in performance.

Comparability

The multiple years of data and comparisons with 2014 performance throughout the report let stakeholders analyze year-over-year performance and compare it against benchmarks.

Accuracy

The information and data contained in the report have been collected according to industry-accepted best practices.

Timeliness

Information contained in the report is of a timely nature at the report's publishing date. Specific safety data are updated on an ongoing, monthly, or quarterly basis.

Clarity

The information is presented in a manner that makes it easy to navigate quickly through the report. A site map and left-hand navigation structure help stakeholders easily access the information they are seeking.

Reliability

There is a standardized process to gather, compile, review, and store all iterations of report content.

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Assurance

Committed to Truth in Reporting

- We obtained limited assurance on our Scope 1, Scope 2, and Scope 3 greenhouse gas emissions and energy data.
- We joined the Aluminum Stewardship Initiative to help develop an independent, third-party certification program for the aluminum value chain.

We provide third-party assurance for some of the more critical data elements contained in our sustainability reporting.

First Environment provided limited assurance on our total 2015 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. (View the limited assurance report in the appendix.) The company also verified the accuracy of the energy data used as a basis for the calculation of these emissions. This is the first time we received third-party verification of our energy data.

In 2015, we again engaged First Environment to provide limited assurance on our Scope 3 emissions for six of the 15 categories—purchased goods and materials, fuels and energy purchased, waste generated in operations, business travel, employee commuting, and transportation and distribution (downstream).

We continued to improve our existing sustainability metrics systems during 2015 to provide clearer and more consistent definitions to be used in every region and location around the world.

In 2015, we were named to the Standard & Poor's 500 Climate Disclosure Leadership Index for transparency in reporting and the high quality of information we provided on our carbon footprint and climate strategy. Our Brazilian operations also received gold certification from the Brazil Greenhouse Gas Protocol Program for transparency in reporting and quantifying its emissions inventories for the fifth year in a row. The certification was granted following an assessment by independent Brazilian auditor RINA. Alcoa was one of the first companies in Brazil to participate in the program.

Internal and External Processes

In addition to our comprehensive internal metrics systems, we employ a variety of processes to bring assurance that our operations are transparent and the information we report is accurate and truly reflective of our actual results. Examples include the following:

- **Internal Audit:** We have a rigorous internal audit process that evaluates our locations on five areas: environmental; health and safety; operational excellence; financial and business processes; and information technology. Additional information can be found on our [Internal Audit](#) web page.
- **U.S. Securities and Exchange Commission (SEC) Filings:** We file or furnish significant information, including our annual, quarterly, and current reports, proxy statements, and sustainability highlights reports with the [U.S. SEC](#), and we are subject to its rules and regulations.
- **Community Advisory Panels:** Under the Alcoa Community Framework, each of our locations is encouraged to convene a community advisory panel to provide a forum for ongoing interaction with area residents. We provide extensive information regarding the issues raised by these community advisory panels, as well as the actions we have taken to address them, in the Stakeholder Engagement section.
- **Annual Employee Survey:** Our Global Voices employee survey, translated into multiple languages, helps us identify best practices for increasing employee engagement and provides insight into our performance.
- **Health and Safety Committees:** Each location has various task, department, ad hoc, and other committees to develop and implement health and safety programs based on the location's strategic health and safety plan. These leadership groups include a cross-section of personnel from the facility.
- **Business Conduct and Conflict of Interest Survey:** We deploy a survey to selected employees each year asking them to certify their compliance with our [business conduct](#), [anti-corruption](#), and [insider trading](#) policies.
- **Integrity Line:** Our [Integrity Line](#) allows employees and any other concerned parties around the world to confidentially report any concerns they may have regarding potential violations of our policies and practices, including those affecting data.
- **Environmental and Social Impact Assessments:** Prior to constructing new facilities or expanding existing ones,

we conduct and publish an environmental and social impact assessment to determine what effects the project would have on the community.

- **External Partnerships:** We partner with many external organizations on a project or ongoing basis to address operational and community issues. Examples can be found in the Stakeholder Engagement section.

External Standards

We rely primarily on our [Values](#) supported by internal policies and standards to guide our behavior.

We believe it is the role of governments, not companies, to sign on to international laws and conventions, such as the U.N. Universal Declaration of Human Rights and the International Labor Organization conventions. However, we are fully aligned with these international laws and conventions, and we use them to guide our internal policies and standards.

Where any international convention is required by the government of a country in which an Alcoa facility is located, our facility will abide by that convention since our locations must follow the laws of the country in which they are located. When an internal requirement exceeds that of the government, which is often the case, our location must abide by this more stringent standard.

A key challenge in our growth strategy is to understand and accommodate the different customs and values that we encounter during our work in various countries. In these situations, we understand that we must engage with these stakeholders to resolve any discrepancies without compromising our own values. We don't have a perfect answer, but we believe that, as a first and continuing step forward, dialogue will help parties understand one another's viewpoints.

As an industry leader, we feel it is important to help develop guidelines and standards that will move the industry closer to sustainability.

In 2015, we joined the [Aluminum Stewardship](#) Initiative, which is a multi-stakeholder, international effort to develop an independent, third-party certification program for the aluminum value chain. We also continued to actively participate in the development and achievement of the [International Aluminium Institute's](#) Aluminium for Future Generations Sustainable Development Programme. This program comprises voluntary objectives and performance indicators that are designed to encourage continual improvement in the industry's sustainability performance.

We are a participant in the [United Nations Global Compact](#), the world's largest corporate responsibility initiative. As a participant, we pledge to advance several goals related to the environment, human rights, labor standards, and

anti-corruption, as well as report on our progress. View our most current report. → [go](#)

We also provide a summary of our actions and activities throughout the world that have directly supported the United Nations' [Millennium Development Goals](#). View our most current report. → [go](#)

External Principles and Initiatives

We subscribe to or endorse the following externally developed principles or initiatives:

- [United Nations Global Compact](#);
- [Extractive Industries Transparency Initiative](#);
- [The Business Roundtable Principles of Corporate Governance](#); and
- [International Aluminium Institute](#) Sustainability Principles.

Sustainability Certifications

Many of our locations are certified to the International Organization for Standardization's ISO 14001 (environmental management systems) standard.

All of our locations and business units can seek ISO certification under our global certificate, increasing overall efficiency in obtaining this certification. Locations that select other registrars can continue their location-specific registration if they choose. Where synergies and business value exist, business unit and location environmental management systems are to be certified through our global certificate.

At the end of 2015, 63 of our locations throughout the world were certified to ISO 14001. We also had 13 locations certified to the Occupational Health and Safety Management System specification (OHSAS 18001).

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Opportunities & Risks

Capturing Opportunities, Minimizing Risks

- In September 2015, we announced a plan to separate our Upstream and Value-Add businesses into two companies.
- Global aluminum consumption is projected to increase by 5% in 2016.
- We use an enterprise risk management process to identify, assess, and monitor risks.

Over the past few years, we have transformed our portfolio by building multi-material Value-Add businesses while creating a globally competitive Upstream commodity business. In September 2015, we announced a plan to separate into two companies that will reflect this transformation. (Read the [press release](#).)

We have increased the competitiveness of our Upstream business by reducing our cost position and expanding our portfolio of value-add products to capture emerging growth opportunities. In 2015, value-add casthouse products represented 67% of our primary metal shipments.

These efforts have positioned our Upstream business to capitalize on the growing demand for aluminum. Global aluminum consumption increased 6% in 2015 and is expected to increase 5% in 2016.

2016 Primary Aluminum Demand and Growth

	Projected Demand Millions of metric tons	Projected Year-over-year Growth Rate Percent
China	30.8	6.5
North America	7.0	4.0
Europe	6.8	1.5
North Asia	4.2	-0.3
India	2.4	7.0
Southeast Asia	2.3	7.0
Middle East and North Africa	2.2	4.0
Other ¹	2.2	3.0
Brazil	1.0	-0.4
Russia	0.9	-0.5
Global	59.7	5.0

Sources: Alcoa analysis as of April 11, 2016; CRU, Wood Mackenzie, IAI, CNIA, NBS, and Aladdin. Figures rounded.

¹Includes Africa, Eastern Europe, Latin America except Brazil, Oceania, and other Asia.

Many of the core markets served by our Value-Add businesses—aircraft, automotive, commercial transportation, and building and construction—are undergoing their own transformations due to increasing government regulations

and customer demand for lighter, stronger, and more sustainable products.

To capture these opportunities, we have developed a strong innovation pipeline that is delivering high-performance multi-material products and solutions for our customers.

2016 End Market Conditions

	North America	Europe	China	Global
Aerospace (sales)				↑ 6% to 8%
Automotive (production)	↑ 1% to 5%	↑ 1% to 4%	↑ 2% to 5%	↑ 1% to 4%
Heavy Duty Truck & Trailer (production)	↓ -23% to -27%	↑ 1% to 5%	↑ 1% to 4%	↓ -4% to 0%
Packaging (sales)	↓ -1% to 0%	↑ 1% to 2%	↑ 5% to 8%	↑ 1% to 3%
Building & Construction (sales)	↑ 4% to 6%	↓ -2% to 0%	↑ 3% to 5%	↑ 4% to 6%
Industrial Gas Turbine (airfoil market)				↑ 2% to 4%

Source: Alcoa analysis as of April 11, 2016.

A full discussion of our business strategy and performance is available in our [2015 Annual Report](#) and [Form 10-K](#).

Challenges

We face a number of challenges as we seek to maximize the value we provide to all of our stakeholders, transform our operations, and more fully integrate sustainability into our company. These include:

- Eliminating employee and contractor fatalities and mitigating all 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 wastes and eliminating landfill disposal of our wastes;
- Mitigating all 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.

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

Risk Management

Our risk-management process was 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 risks identified 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 vigilant of key risks impacting 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 the significant risks we face can be found in our [Form 10-K](#) for the year ended December 31, 2015. 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.

Net Positive

Expanding Our Handprint

- In 2015, we undertook an initiative to quantify the carbon avoidance achieved through the use of our products.
- At year's end, we had quantified greenhouse gas handprints for more than 85% of our products.

As a sustainability leader in the metals industry, we recognize that it is not sufficient for us to “do less bad.” We must strive to have a positive impact on the environment by not only reducing our own carbon footprint but also reducing our customers’ footprints through the use of our innovative and energy-saving products.

Manufacturing aluminum is energy-intensive and results in significant greenhouse gas emissions. Conversely, products made from our lightweight aluminum and other metals can use less energy and emit fewer greenhouse gases than those produced from heavier materials. The point where the greenhouse gases avoided in the use phase of our products exceed those emitted in the production phase is a state we refer to as net positive.

In 2015, we undertook an initiative to both quantify the carbon avoidance achieved through the use of our products and also create a repeatable methodology to track this greenhouse gas handprint. We worked with each of our businesses to understand the energy and greenhouse gas benefits enabled through the use of nearly every product that we manufacture.

At the end of 2015, we had developed handprints that show greenhouse gas avoidance in the use phase for more than 85% of our products, including the following:

- Our lightweight **Ultra ONE™** commercial vehicle wheel featuring our proprietary MagnaForce™ alloy is 17% stronger than existing alloys. The wheel reduces overall rig weight by 272 kilograms (600 pounds) when converting from steel wheels, translating to a positive handprint of 18.3 metric tons of carbon dioxide saved per truck over its lifetime.
- The shift to high strength, lightweight aluminum alloys on the Ford F-150 pickup truck helped take approximately 318 kilograms (700 pounds) out of the vehicle, with about 181 kilograms (400 pounds) attributed to aluminum. As a result, each F-150 will save 4.6 metric tons of carbon dioxide during its lifetime.
- A 3.5-megaliter (12-ounce) aluminum can has a higher recycling rate, recycled content, and use-phase greenhouse gas benefit compared to a glass bottle of the

same size. For every million glass bottles substituted with aluminum, 162,000 metric tons of greenhouse gas emissions can be avoided.



Ultra One wheel

Based on handprints for more than 85% of our products, we believe we are already net positive from a greenhouse gas standpoint. We are working toward our new target of demonstrating a net reduction in greenhouse gas emissions from the use of our products equal to three times the emissions generated through their production.

We continue to review the findings with individual businesses, explore third-party validation of the methodology and data, and understand how our net positive initiative can further embed sustainable innovation into our product development processes.

Related Information

- Products section ([page 19](#))
- [Alcoa Innovation](#)

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GROWING OUR HANDPRINT

Our lightweight metal innovations create a more sustainable world while helping solve some of society's biggest challenges.

Designing Sustainable Products and Solutions

- We determined the positive greenhouse gas impact of almost all of our products.
- We unveiled our Ampliforge™ process, which allows us to design and 3D-print a near complete part and then treat it using a traditional manufacturing process.
- We introduced a lightweight, all-aluminum commercial truck frame still in development that will reduce truck weight by more than 40% compared to steel frames.

The global markets in which we compete are increasingly driven by significant challenges, including urbanization, climate change, and resource scarcity. Our inherently sustainable products are making significant contributions to the world by enabling our customers to address these challenges and capture the opportunities they present.

Lightweight, tough, strong, durable, and recyclable, our products can save energy and fuel and reduce greenhouse gas emissions. They enable safer, more efficient buildings; more fuel-efficient cars, trucks, and airplanes; sustainable food and beverage packaging; high-performance defense vehicles; oil and gas drilling miles beneath the Earth's surface; and cleaner power generation.

We manufacture a wide variety of high-performance, multi-material products and solutions. Our Upstream business produces aluminum ingot, billet, and slab from our mining, refining, smelting, and casting assets. Products from our Value-Add businesses are made from aluminum, titanium, nickel, and steel. These products include sheet, plate, foil, extrusions, forgings, fasteners, rings, building systems, pipe, wheels, castings, and more.

We serve eight markets— aerospace, automotive, commercial transportation, building and construction, packaging, consumer electronics, oil and gas, and defense.

Sustainable Design

Design thinking at the front end is one way we embed sustainability into our product innovation process.

Our goal is to develop products and solutions that use energy and natural resources more efficiently and reduce environmental impact. In doing so, we increase both our sustainability and that of our customers, who continue to demand more sustainable products.

Life cycle assessment, which analyzes a product's environmental impact from cradle to cradle, is the best way to evaluate the sustainability aspects of our products. We conduct these assessments with other organizations and

our customers to provide a holistic view of the impacts and benefits in each product phase—extraction and processing of raw materials through manufacturing, distribution, use, and recycling.

We were the first aluminum company to receive [Cradle to Cradle Certification](#), which is a multi-attribute eco-label that assesses a product's safety to humans and potential impact on the natural environment.

We currently hold Bronze certification for our primary aluminum and other aluminum products—forged truck wheels, lithographic sheet, can sheet, bottle stock, and four product lines from our [Kawneer](#) architectural systems business.



In 2015, we completed an ambitious initiative that determined the positive greenhouse gas impact of almost all of our products and created a repeatable methodology to track this greenhouse gas handprint. (See the Net Positive section for additional information.)

Alcoa Foundation supported sustainable design projects in 2015 that focused on the role of architecture and transportation in regards to the environment in Brazil, Germany, Mexico, the Netherlands, Turkey, and the United States. Partners included the [Center for Automotive Research](#), [International Living Future Institute](#), [Cradle to Cradle Products Innovation Institute](#), and [World Resources Institute's EMBARQ program](#).

Using a multi-stakeholder approach, the partners are actively engaging governments, corporations, scientists, non-profit organizations, university professors and students, and community members to develop solutions that reduce weight, improve fuel efficiency, and minimize the environmental footprint of mass transportation. Others are exploring the role of architecture and design in building and construction to

enable adaptation to climate change, while enhancing the environmental and social sustainability of cities.

Aerospace

Our high-performance aluminum, titanium, and nickel-based alloy products are found from nose to tail on every high-growth commercial aircraft platform. These products produce lighter, more fuel-efficient planes with highly efficient engines and smaller carbon footprints—all without compromising safety, performance, and durability.

We have developed new aluminum alloys and third-generation aluminum-lithium alloys that provide a 5% to 7% improvement in density, a 7% improvement in stiffness, and the potential to reduce the weight of complete aircraft structures by 10% versus composites for certain applications. These new alloys also improve corrosion, fatigue, and damage tolerance properties and deliver passenger comfort features equivalent to composite-intensive planes.



Seamless rolled ring for aerospace engines

In 2015, we completed our acquisitions of TITAL, a leader in titanium and aluminum structural castings for aircraft engines and airframes, and RTI International Metals, a global supplier of titanium and specialty metal products and services for the commercial aerospace, defense, energy, and medical device end markets.

We also completed an approximately US\$100 million expansion at our La Porte, Indiana, USA, facility that enables us to manufacture advanced jet engine parts that are nearly 60% larger than those we previously produced. We also announced a US\$60 million expansion at the Alcoa Technical Center near Pittsburgh, Pennsylvania, USA, to accelerate the development of advanced 3D-printing materials and processes for aerospace and other high-growth end markets. In addition, we are investing US\$22 million in hot isostatic pressing technology at our facility in Whitehall, Michigan, USA, to strengthen the

metallic structure of traditional and additive-manufactured parts made of titanium and nickel based super-alloys.

In 2015, we unveiled our Ampliforge™ process, which allows us to design and 3D-print a near complete part and then treat it using a traditional manufacturing process, such as forging. In addition to increasing part toughness and strength, the process significantly reduces material input and simplifies production relative to traditional forging processes.

Learn more. → [go](#)

Automotive

Lightweighting is a key enabler for automakers to manufacture cars and light trucks that are more fuel-efficient and therefore emit less carbon dioxide to meet consumer demands and tightening emissions regulations.

Our lightweight solutions for the automotive market include body sheet, brazing sheet, wheels, extrusions, and automotive fasteners, which together can provide up to a 50% weight reduction as compared to steel. The aluminum-intensive Ford F-150 truck, for example, is up to 317 kilograms (700 pounds) lighter than its steel-heavy predecessor.



Automotive sheet produced at Tennessee Operations

Automotive emission reductions related to improved fuel efficiency can be significant:

- A 10% reduction in an automobile's weight can result in up to a 7% reduction in the vehicle's greenhouse gas emissions. (Source: Aluminum Association)
- For every 1.0 kilogram (2.2 pounds) of aluminum used to replace higher density steel or iron components in a vehicle, there is the potential to save 20 kilograms (44 pounds) of carbon dioxide emissions over the **CAFE**-certified drive cycle. (Source: International Aluminium Institute)
- A **life cycle assessment** of an aluminum-intensive vehicle indicated a 20% reduction in primary energy consumption and a 17% decline in carbon dioxide

emissions over the vehicle's life cycle compared to a baseline steel Toyota Venza. (Source: Oak Ridge National Laboratory)

Our recent innovations for the automotive market include [Alcoa 951 bonding technology](#), which enables the mass production of aluminum-intensive vehicles. Our [Alcoa Micromill®](#) material, which produces automotive parts that are twice as formable and 30% lighter than parts made from high-strength steel, debuted on Ford's 2016 F-150 truck in 2015.

In September 2015, we completed a US\$300 million expansion at our Tennessee, USA, facility that is dedicated to supplying aluminum sheet to the automotive industry.

Learn more. → [go](#)

Commercial Transportation

Our portfolio of aluminum sheet, extrusions, wheels, and fastening systems can be used to replace heavier metals for many commercial truck components with significant weight savings, resulting in increased fuel economy and reduced emissions.

For every 10% of weight reduction in a Class 8 truck, which is a popular truck in North America that is also the highest emitter of diesel particulate and carbon dioxide emissions, drivers can gain up to a 5.5% improvement in fuel economy (Source: Aluminum Association). An International Aluminium Institute's life cycle assessment shows the potential to save 28 kilograms (62 pounds) of carbon dioxide emissions in articulated trucks and 45 kilograms (99 pounds) in city buses for every 1.0 kilogram (2.2 pounds) of aluminum used to replace higher density steel or iron components.

In general, one metric ton of weight reduction equals a savings of up to 12,870 liters (3,400 gallons) of diesel fuel over a truck's life. In addition, 18 metric tons of carbon dioxide emissions are saved for every one metric ton of aluminum that replaces heavier steel on a truck.

In 2015, we introduced a lightweight, all-aluminum frame for Class 8 trucks in collaboration with [Metalsa](#). Still in development, the lighter weight frame will reduce truck weight by more than 40 percent compared to steel frames, saving nearly 408 kilograms (900 pounds) per vehicle, increasing fuel efficiency and payload. Additionally, the frame's increased stiffness will double rigidity, enabling a smoother ride. The aluminum frame also offers superior corrosion resistance compared to steel, prolonging the vehicle's life span.

Another area of focus is lightweight aluminum tanker trucks, which can carry larger payloads compared to a steel tanker. A U.S. aluminum tanker, for example, holds 1,515 to 1,890 liters (approximately 400 to 500 gallons) of additional liquid. This reduces the amount of fuel consumed for transportation



All-aluminum truck frame

by 3% and carbon dioxide emissions by 70 metric tons per truck per year due to a reduction in the number of trips or trucks required.

Weight savings and longevity are also gained by switching to aluminum wheels. Our 18-kilogram (40-pound) Ultra ONE™ heavy-duty truck wheel is 47% lighter than a steel wheel of the same size, while our Dura-Bright® EVO wheel is 10 times more resistant to corrosion than its predecessor. The latter was named a top 20 product by Heavy Duty Trucking magazine in early 2016.

To help customers understand the benefits of aluminum over a product's entire life cycle, we offer an online tool called [CalcuLighter™](#) that determines the return on investment when comparing wheel options.

Learn more. → [go](#)

Building and Construction

Buildings are major consumers of power and emitters of greenhouse gases.

Aluminum architectural systems can improve energy efficiency, reduce carbon dioxide emissions, help achieve green building standards, and increase occupant comfort and security.

According to the International Aluminium Institute, building facades incorporating aluminum systems can decrease energy consumption by up to 50%. Other sustainable properties include:

- **Recyclability:** About 95% of aluminum used in buildings today is recycled.
- **Reflective surface:** Aluminum's highly reflective surface allows for efficient light management and lower energy consumption, keeping buildings cool in hot climates.

- Resiliency: Aluminum is long-lasting, can withstand severe weather, and protects against natural disasters and blast events.
- Light weight: Light yet strong, aluminum reduces transportation costs, vehicle fuel consumption, and related carbon dioxide emissions when being delivered to the construction site.
- Thermal efficiency: Architectural aluminum systems that use advanced thermal technologies can provide superior thermal performance without compromising on structural performance.



GLASSvent UT Windows

Photo © David Wakely Photography

We manufacture a wide array of aluminum entrances, store-front framing systems, curtain walls, and windows that help make buildings more sustainable. Our recent innovations include [Reynobond® NC Double Sheet](#) aluminum composite material panels, [AA™250/425 Thermal Entrances](#), [RT 72 HI+](#) windows and doors, [GLASSvent™ UT Windows](#), [OptiQ™ Ultra Thermal Windows](#), [2500 UT Unitwall™ System](#), and the [AA®720 FR](#) and [AA100/110 FR Fire Resistant](#) platforms.

We also have developed state-of-the-art framing and wall systems that are hurricane- and blast-resistant and have been tested to industry standards and state mandates. These systems are designed to minimize vulnerabilities and provide increased security to protect occupants against damage and devastation.

The industry is increasing its focus on transparency of environmental and human-health impacts of building and construction products across the entire life cycle. In support of product transparency, we have taken our life cycle assessment information and created [environmental product declarations](#) (EPDs). EPDs are the new building and construction standard to better communicate the environmental impacts associated with the manufacturing of building products.

Learn more. → [go](#)

Packaging

Aluminum is one of the most sustainable solutions for food and beverage packaging.

With a 73% global recycling rate, the aluminum can is the most recycled beverage container in the world. According to the [Aluminum Association](#), cans are recycled and back on store shelves in as few as 60 days. Recycling these cans uses only 8% of the energy required to make new aluminum ingot and creates 92% less greenhouse gas emissions.

A recent [life cycle assessment](#) on the aluminum can and a 2015 Aluminum Association study found that today's aluminum cans:

- Have a 20% smaller carbon footprint when compared to 2010;
- Contain an average of 70% recycled content compared to 23% for glass and 3% for plastic/polyethylene terephthalate bottles;
- Require 14% less energy to make when compared to those made in 2010; and
- Weigh 38% less than they did more than 40 years ago.

We produce aluminum sheet for the packaging products end market. We are a recognized innovation leader, creating new packaging solutions that include the aluminum bottle, shaped packages, and aluminum closures. Our customers also use our sheet to manufacture the bodies, ends, and tabs of cans and bottles for the beer, soft drink, functional drink, food, and pet food industries.

Learn more. → [go](#)



Aluminum packaging for the microbrew segment

Photo courtesy of Oskar Blues Brewery

Consumer Electronics

Manufacturers of laptops, tablets, smartphones, televisions, and other consumer electronics are turning to aluminum to meet their sustainability, aesthetic, design, and performance goals.

Our solutions, which involve complex, high-strength extruded and sheet products for structural components, deliver these advantages:

- Durability: Lasts longer without breaking, cracking, or deteriorating.
- Heat conduction: Conducts heat more effectively than competing materials, reducing power usage.
- Light weight: Enables thinner and lighter devices, reducing transportation emissions.
- Efficiency: Reduces part count and shortens assembly time, resulting in lower production costs.
- Aesthetics: Produces consumer-valued premium surfaces that are available in a wide range of finishes.
- Recyclability: Offers infinite recyclability.

In 2015, our Consumer Electronics Market Development team worked on several projects with customers to improve the sustainability of their products and processes. These included increasing the use of metal produced with hydropower, improving rolling processes to minimize the carbon footprint, replacing solvents and oils with more sustainable alternatives, and creating specialty chemistries with reduced contaminants.



Samsung Galaxy S6 smartphone

Another 2015 highlight was Samsung's introduction of the Galaxy S6® and S6 edge® smartphones, marking the first time the company used an aluminum frame for its flagship model. The frame is made of our 6013 Power Plate, which is 70% stronger than standard aluminum for a thinner, lighter, and sleeker design.

Learn more. → [go](#)

Oil & Gas

Our advanced materials technology enables customized, high-performance solutions to address some of the oil and gas industry's most difficult challenges. We produce proprietary, lightweight, high-strength alloy drill pipe and subsea

riser systems, engineered forgings and extrusions, and fabricated products for onshore and offshore drilling.

In addition to performance benefits like lower torque and increased rig depth, our [FarReach™ alloy drill pipe](#) lowers emissions, fuel consumption, and costs for more efficient drilling. In a well in the Utica Shale deposit in the United States, for example, replacing part of a steel drill string with FarReach™ alloy drill pipe increased maximum drill depth by 36% and saved the operator US\$150,000 per well.



FarReach alloy drill pipe

Our Alcoa MaxReach™ alloy drilling riser reduces riser weight by as much as 60%, allowing existing rigs to drill in 50% deeper water without costly and time-consuming upgrades. The light weight, high strength and corrosion resistance of our titanium stress joints deliver more effective operations and longer product lifecycles, resulting in long-term savings.

The majority of our oil and gas products are recyclable.

Learn more. → [go](#)

Defense

We develop multi-material defense solutions for air, land, and sea that are safer, lighter, faster, and stronger. In addition to high performance, our solutions deliver sustainability through less fuel consumption, lower emissions, reduced costs, and, in many applications, recyclability.

Air

- Our monolithic aluminum bulkhead solution for the U.S. military's F-35 Joint Strike Fighter reduces total material volume and part count, simplifies assembly, saves approximately 135 to 180 kilograms (300 to 400 pounds) per jet, and nets up to a 20% cost savings over a built-up structure.
- To keep legacy aircraft flying longer, we have developed replacement parts in newer alloys that are lighter and stronger, extend the useful life of existing assets, and reduce

future life cycle costs due to improved corrosion resistance.

- Through combining multiple parts into a single, high-strength titanium investment casting for the U.S. military's V-22 Osprey aircraft, we provided an 80% savings in assembly and a 70% reduction in weight to the tilt-rotor transmission system.

Land

- By replacing hundreds of individual metal parts with our high-strength, lightweight titanium investment castings, the M777 howitzer is tougher and half the weight of conventional towed artillery. The equipment is used by the U.S., Canadian, and Australian militaries.
- Our full-scale, single-piece forged aluminum hull for combat vehicles has demonstrated better resistance to blast damage from landmines and improvised explosive devices, allowing for a higher level of vehicle and troop survivability. (Read the [press release](#).)
- We have produced more than 45,300 metric tons of aluminum armor, giving U.S. and European-designed tactical vehicles ballistic protection at a fraction of the weight of traditional steel armor.



The world's largest single-piece forged aluminum hull for combat vehicles

Sea

- On a vessel where speed is essential and every pound matters, 474 of our innovative mission bay tie-down fittings reduce weight by eight metric tons.
- We produce the all-aluminum hull, deck, and superstructure of the U.S. Navy's Littoral Combat Ship and the joint high-speed vessel, which do not require ozone-depleting paints used on traditional naval vessels.

Learn more. → [go](#)

Innovation

In all of our markets, we are an innovation leader. From products that advance industries to processes that transform the manufacturing landscape, we are dedicated to discovering and developing the next game-changing breakthrough.

Learn more. → [go](#)

Related Information

- Net Positive section ([page 17](#))
- Recycling section ([page 25](#))

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Recycling

Closing the Material Loop

- Aluminum's infinite recyclability makes it a sustainable choice and critical component of a circular economy.
- Alcoa Titanium & Engineered Products implemented a comprehensive strategy to increase the use of post-consumer material in aerospace markets in 2015.
- In 2015, we recycled tens of thousands of metric tons of aluminum scrap in a closed-loop system for the aluminum-intensive Ford F-150 truck.

Aluminum is infinitely recyclable, making it the sustainable choice in many of the markets we serve and a critical component of a circular economy.

Approximately 75% of all primary aluminum ever produced since 1888 is still in productive use due to its strength, product life, and recyclability. Recycling aluminum only uses about 8% of the energy required to make new aluminum ingot and emits 92% fewer greenhouse gases.

Aluminum used in the transportation, building and construction, and lithographic markets is recycled at rates near or above 90%, while the global recycling rate for aluminum cans is 73%. We connect with both customers and consumers to increase the amount of aluminum that is recycled globally.

As we continue to offer our customers lightweight, multi-material solutions, we also recognize the need to develop and implement processes to return valuable metals to the industrial ecosystem at the end of a product's useful life. This will preserve material value and keep waste to an absolute minimum.

Aerospace

Alcoa Titanium & Engineered Products, which manufactures advanced titanium and other specialty metals products,



Titanium-based turnings that have been formed into briquettes

implemented a comprehensive strategy to increase the use of revert, or post-consumer material, in aerospace markets in 2015. This included opening channels for new sources of third-party revert and also establishing closed-loop agreements with our aerospace customers. While much of Alcoa Titanium & Engineered Products' revert is recycled back into aerospace-grade alloys, some is reused in ferro-titanium ingots for high-strength steel applications in the automotive industry.

In a separate program, we segregated and recycled valuable aerospace alloys through a closed-loop system with Boeing in 2015. We are currently exploring similar closed-loop systems for our aluminum-lithium alloys.

Automotive

Our breakthrough [Alcoa 951 bonding technology](#) is enabling more cost-effective mass production of aluminum-intensive vehicles, helping the automotive industry meet challenging emissions standards through lightweighting while preserving and improving the strength and performance requirements of the materials.

As the volume of aluminum automotive sheet in the market increases, we are developing programs to bring like-alloy aluminum scrap back to our facilities for reprocessing into new automotive sheet.

For example, our closed-loop system with Ford for its aluminum-intensive F-150 truck resulted in tens of thousands of metric tons of aluminum scrap being recycled into new military grade automotive sheet in 2015 at our Tennessee Operations and Davenport Works (USA) locations. We will be expanding the program in 2016 to include aluminum scrap from larger Ford trucks, including the F-250.

In addition to Ford, we work with other automotive customers to reinforce the value of segregated aluminum scrap in closed-loop buy-back agreements.

Commercial Transportation

We operate facilities in Monterrey, Mexico, and Barberton, Ohio, USA, that use Hertwich furnace technology to recycle aluminum wheel scrap into ingot for new wheels.

In addition to scrap generated in the wheel-making process, we recycle post-consumer wheels, recycled secondary ingot, and various other types of scrap as available.



Scrap for recycling

Building & Construction

[Alcoa Kawneer](#) provides extrusions that average 50% recycled content to meet the growing demand of high-performance building certifications, such as [LEED](#), for all of its architectural products. Virtually 100% of the extrusion scrap generated in Kawneer's production process is returned to billet manufacturers for recycling.

Packaging

We recycle billions of aluminum cans annually at our Tennessee Operations in the United States, which is the largest can reclamation facility in the Americas. We use this recycled metal to make new can sheet—which is Cradle to Cradle CertifiedCM—that our customers convert into beverage cans.

Throughout the world, we are actively involved in increasing consumer awareness to boost the recycling rate of aluminum cans and other materials.

Globally, Alcoa Foundation and Alcoa invested approximately US\$7.3 million in recycling initiatives between 2007 and 2015, with many focused on boosting the U.S. can recycling rate of 67%. These included the following in 2015:

- Support for [Keep America Beautiful's](#) RecycleMania college recycling competition that resulted in the recycling and composting of 36,333 metric tons of waste;

- Sponsorship of the [College and University Recycling Coalition webinar series](#);
- Partnership with the [Center for Climate and Energy Solutions](#) to host five Alcoa Green Fairs, including the first international Green Fair in Brazil. The free events are designed to educate and inform the community about best practices in recycling and sustainability;
- Support of the Trash Management and Recycling educational series through the [Central Park Conservancy](#); and
- Support for and expansion of recycling programs in 71 U.S. communities through grants and assistance provided by Alcoa Foundation's partnership with [The Recycling Partnership](#). The partnership reached more than 1.2 million households in 2015 through engagement of the full recycling supply chain, from local governments to industry end markets, haulers, material recovery facilities, and converters.

Process Waste Recycling and Reuse

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

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 & Emissions section.)

Related Information

- Products section ([page 19](#))

[Back to index](#)

Our People

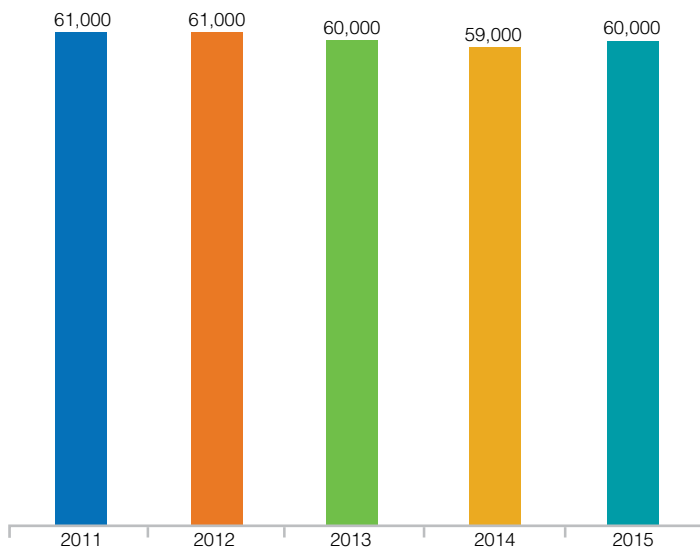
Strengthening Our Sustainable People Advantage

- Alcoa received top ranking in the Human Rights Campaign Foundation's Corporate Equality Index for the seventh consecutive year.
- From 2010 to 2015, employee engagement scores in our annual Global Voices Survey increased from 60% to 78%.
- We have identified successors for 97% of our most critical roles.

Our employees drive our success through their innovation, pursuit of excellence, and commitment to upholding our **Values** everywhere we operate in the world. They are our sustainable advantage.

To attract, develop, and retain world-class talent, we have created a culture that embraces diversity, drives inclusion, and empowers and engages our employees. We provide our people with ongoing opportunities for personal and professional growth, and we reward their efforts to take themselves and Alcoa to the next level of performance.

Number of Employees



While being a global company sometimes presents challenges, such as differing cultural issues and governmental regulations, competition for top talent, and our decentralized structure, we are developing processes and programs that will strengthen our ability to grow our human capital.

2015 Employees by Region

	Asia	Australia	Europe	North America	South America	Total
Male	1,600	3,500	12,500	26,500	3,200	47,300
Female	400	500	3,500	7,500	800	12,700
Total	2,000	4,000	16,000	34,000	4,000	60,000

The figures for Europe include Alcoa employees based in Africa.

Inclusion

We define inclusion as our ability to engage and leverage the differences and many perspectives that our people bring to the workplace.

As a global company, we have a workforce that offers different viewpoints, perspectives, and experiences. This diversity is invaluable in helping us better understand and meet the needs of our customers and the communities in which we operate. As such, we have undertaken numerous initiatives to ensure all employees feel valued, are encouraged to express their ideas and opinions, and are challenged to reach their full potential.

2015 Employees by Contract and Employment Type

	Employee Contract			Employment Type		
	Permanent	Temporary	Unassigned	Full-Time	Part-Time	Unassigned
Male	46,800	1,000	80	47,000	850	80
Female	11,700	400	20	11,500	550	20
Total	58,500	1,400	100	58,500	1,400	100

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).

In 2015, we received top ranking in the Human Rights Campaign Foundation's **Corporate Equality Index** for the seventh consecutive year. We achieved a top score of 100 on the 2016 index, which evaluates U.S. companies on lesbian, gay, bisexual, and transgender (LGBT) equality. We not only earned the designation of a Best Place to Work for LGBT Equality, but we were also the only metals and mining company to receive a perfect score. Our 100% ranking earned us the designation as a "Best Place to Work for LGBT Equality."

Executive Accountability

All Alcoa leaders are held accountable for inclusion, which is integrated into our overall business strategy.

We tie 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% of the total variable payment opportunity, are updated annually. The 2015 targets at the executive level were:

- Global women: 22.3%
- U.S. minority: 16.9%

At the end of 2015, women comprised 22.8% of our global executive positions, and minorities accounted for 16.8% of our U.S. executive positions. For 2016, we have set targets of 23.2% of women in global executive roles and 17.2% of U.S. minorities in such roles.

Global Women in Professional and Executive Positions

	Professional	Executive
2011	25.0%	17.6%
2012	25.3%	19.0%
2013	26.2%	20.8%
2014	26.5%	21.8%
2015	28.3%	22.8%

U.S. Minorities in Professional and Executive Positions

	Professional	Executive
2011	15.4%	13.2%
2012	17.1%	16.0%
2013	18.0%	15.6%
2014	18.1%	16.4%
2015	19.0%	16.8%

CASE STUDY

STEM-focused Program Gives Young Girls POWER in Hungary

A year-long educational program combined with job shadowing not only introduced a generation of young girls to careers in science, technology, engineering, and math (STEM), it also increased diversity at Alcoa Wheel Products Europe (AWPE) in Székesfehérvár, Hungary.

Like other manufacturers in Hungary, AWPE traditionally had a low representation of women in its workforce—about 11% in technical roles and never more than 20% in all positions. Compounding the issue was women made up less than 10% of students in the country's technical universities and colleges.

AWPE decided to target girls ages 12 to 17 in an effort to build diversity in the future workforce. The resulting Progression of Women EngineerRs (POWER) initiative during the 2014/2015 school year had two components. The first was a year-long experiential learning program focused on STEM-related subjects that was implemented in four high schools as an extension of the standard curriculum. As part of the program, the schools invited the participants' parents to career coaching workshops where they could learn about STEM career opportunities for their daughters.

POWER also included a one-day job-shadowing event at the AWPE facility and other area companies for 105 students from approximately 30 local schools. The girls and

their parents also attended a gala event that included a competition for the students and career coaching workshops for the parents.

The program reached more than 600 students and 100 parents. It also increased awareness of diversity among AWPE's leaders and employees, which led to changes in recruitment and succession-planning practices. At the end of 2015, women held 18% of technical positions and 29% of all positions in the business.

The POWER program is continuing in the 2015/2016 school year.



Teamwork exercise

Domestic Partner Benefits

We provide coverage for domestic partners of either gender and their children under our U.S. health and welfare plans. Domestic partners are also eligible for survivor benefits under our defined benefit pension plans for approximately 9,200 of our salaried and non-bargained hourly employees who are covered by these programs. Our retiree medical plans for salaried and non-bargained hourly employees (approximately 4,900), which were closed to new hires as of January 1, 2002, also provide coverage to domestic partners.

Corporate-wide Employee Networks

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

Alcoa Women's Network

Since its founding in 2003, the Alcoa Women's Network has served as a catalyst for the recruitment, development, advancement, and retention of women at Alcoa. At the end of 2015, there were 49 local networks globally with more than 1,200 members.

Alcoa African Heritage Network

The Alcoa African Heritage Network, which was established in 2004, focuses on the recruitment, development, advancement, and retention of African-heritage employees. The network had 457 employee members at the end of 2015.

Employees at Alcoa for Gay, Lesbian, Bisexual, and Transgender Equality (EAGLE)

Launched in 2007, EAGLE is a network of LGBT employees, as well as other Alcoa employees—known as EAGLE Allies—who support advancement of gay, lesbian, bisexual, and transgender initiatives. At the end of 2015, the network had 679 members in 14 countries.

Alcoa Veterans Network

The Alcoa Veterans Network, which launched in 2015, is committed to promoting diversity, inclusion, community involvement, and leadership development for all Alcoas, with a special focus on active reservists and veterans worldwide. The three main objectives of the network are career development and talent acquisition, culture, and community and camaraderie. The network had 306 members in its inaugural year.

Site-based Networks

Supporting our corporate-wide networks are those based at specific U.S. locations that focus on varying employee groups, including new professionals and people of Hispanic and Asian heritage.

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.

Our compensation approach encompasses base pay, variable pay, and appropriate benefits that meet or exceed legal minimums and are compliant with all applicable laws. The structure is designed to deliver median compensation within a specific labor market, with higher compensation awarded for superior individual or team performance.

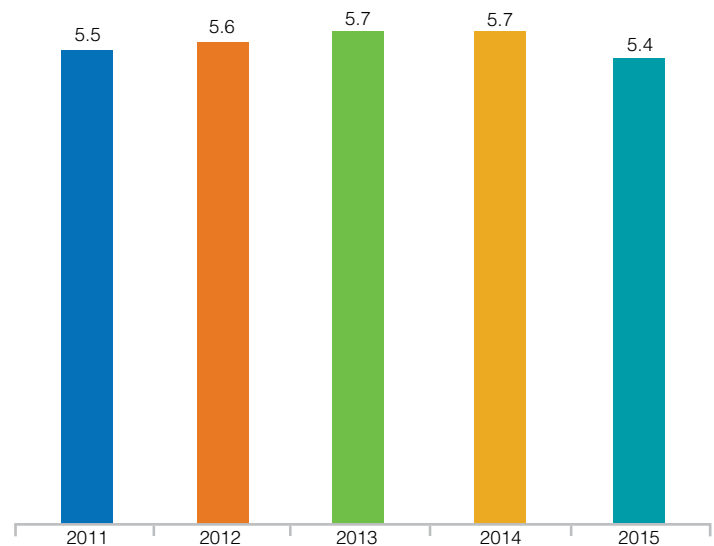
Up to 20% of our annual variable compensation plan formula is tied to achieving significant aspects of our sustainability targets. These include safety, diversity representation in our workforce, and reductions in carbon dioxide emissions due to process improvements and improved energy efficiency. These targets were represented by the following percentages in the annual variable compensation plan formula at the corporate level in 2015:

- Safety: 5%
- Diversity: 10%
- Carbon dioxide reductions: 5%

Our 2015 payouts were 0% for safety, 13.3% for diversity, and 4% for carbon dioxide reductions.

Labor Costs

Billions of U.S. dollars



Data 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. Data exclude contract and temporary labor expenses.

Executive Compensation

Our executive compensation programs are designed to motivate our top leaders to take actions that are best for the long-term performance of the company while delivering

positive annual results. As such, we place heavy emphasis on performance-based incentive and equity compensation.

As executives move to greater levels of responsibility, the percentage of their pay based on performance is increased. In addition, the percentage of total compensation paid in the form of equity also increases as executives have increasing responsibility for business unit, group, or corporate performance.

For a more thorough overview of our executive compensation, please see the Compensation Discussion and Analysis in our [annual proxy statement](#).

General Compensation

We have a flexible compensation structure that features 18 job bands and wide salary ranges. An employee's position within a band is determined by many factors, such as performance, time in position, and salary history. Employees can move further along a band or into a higher band through promotions, increased responsibilities, sustained exceptional performance, and acceptance of career development opportunities.

Benefits

Our benefits vary by country due to statutory requirements and management priorities. Examples include health insurance, disability insurance, life insurance, and pension benefits.

Recognition

A variety of recognition programs at the corporate, business, and location levels reward and recognize employees for exceptional performance.

Under the You Make a Difference Award Program, for example, Executive Council members and senior regional leaders instantly recognize and reward individual employees who achieve exceptional results that go beyond normal job expectations. Another program, the Global Impact Awards, recognizes teams of employees for exceptional business impact and creative ways to solve business problems effectively.

We also award special quarterly stock grants to employees who make outstanding long-term contributions to the company. These grants are intended for professional employees

CASE STUDY

Programs Unlock Education, Employment Opportunities for Youth

Throughout the world, Alcoa is helping build local talent to not only strengthen our workforce of the future but also help remove barriers to education and employment that many young people in the communities in which we operate face.

Australia

Recognizing that slightly more than 50% of 19 to 24 year olds in the Portland area complete 12 years of schooling, Portland Aluminium smelter launched the Future Leaders of Industry program in 2005. Each year, 21 students in grades 10 through 12 are awarded an A\$500 scholarship to assist with schooling needs. Recipients are also introduced to various aspects of industry through structured events, and each is assigned a mentor.

More than 200 students have participated in the program. Based on a 2014 survey of former participants, nearly 80% moved into further training, college, or apprenticeships.

United Kingdom

Our Kitts Green facility faces a high employee retirement rate in the next five years and a local talent pool significantly lacking manufacturing and engineering skills. To address the challenges, the location created an internship

program; funded a library in a local secondary school, a new computer suite in a local primary school, and interactive lessons in science, technology, engineering, and math; and supported the effort of employee volunteers to improve reading skills in the local primary school.

Approximately 78% of participants in the internship program secured full-time employment in the manufacturing sector. In addition, 92% of Kitts Green's apprentices and 49% of new hires between 2012 and 2015 lived within three to five miles of the plant.



A mentor and student from the Future Leaders of Industry program

who are not eligible for annual equity grants. A total of 568 employees received an award under this program in 2015.

TALENT MANAGEMENT

We source, engage, develop, and advance the best talent and leverage their full potential across our company.

Source

We continued to face intense competition for leadership, technical, and operational talent during 2015.

To overcome this challenge, we established a broad approach to identify and acquire top talent. We operate internship programs, partner with technical institutions, and collaborate with non-governmental organizations on workforce development. We also make it a priority to hire locally at competitive wages to contribute to the sustainability of the communities in which we operate.

To align with our commitment to diversity, our talent acquisition team accomplished the following in 2015:

- Attended the national conferences of five major diversity organizations in the United States;
- Partnered with the student chapters of these organizations at 17 colleges to acquire the best new talent coming out of these campuses;
- Worked with representatives from our employee networks and businesses to identify, interview, and hire candidates; and
- Partnered with Alcoa Foundation and various U.S. locations to attend, support, and recruit at Hiring Our Heroes events, a nationwide initiative to help veterans, transitioning service members, and military spouses find meaningful employment.

All talent acquisition team members also attended a comprehensive two-day diversity training course to become certified in the latest sourcing techniques for experienced diverse talent.

Engage

An engaged workforce is critical to meeting our business objectives. High employee engagement leads to improvements in critical performance areas, such as retention, absenteeism, and productivity.

Each year, we measure our employee engagement through our annual Global Voices Survey. This web-based tool is produced in 15 languages and contains 50 questions that measure 11 dimensions of the employee experience—employee engagement; supervisor effectiveness; leadership/vision; community commitment; diversity/inclusion; environment, health, and safety commitment; perceptions of ethics and compliance; valued employee; quality; values; and

survey follow-up. We use the survey results at the corporate, business, and location levels to build upon our strengths and address identified gaps.

Our overall employee engagement score in the survey was 78% in 2015, up from 77% in 2014. Although the survey response rate of 90% was one percentage point lower than 2014, the rate remains higher than most external benchmarks that we follow.

Our businesses and locations use the results to develop targeted action plans that are based on a statistical analysis of key engagement drivers. We use both traditional correlation analysis and partitioning analysis, as well as a data-modeling technique that we developed to determine which factors of engagement to focus on to improve each location's employee work experience.

2015 Employee Voluntary Turnover Rate

Percent

Men	Women	Total
4.5	4.7	4.5

Develop

MATERIAL ISSUE

We offer a variety of programs and processes to develop high-performing employees throughout the various stages of their careers.

Performance Management Process

Our performance management process is designed to focus on goal achievement to improve individual and organizational performance. It is linked with our overall people development and succession planning processes and completely integrated with our compensation system.

The performance management process is a continuous loop of planning, monitoring, executing, coaching, and assessing results. It begins with an employee and his or her manager creating a plan for performance and development throughout the year, with specific goals and expected outcomes. The development plan, which the employee owns, may be a combination of e-learning, formalized courses, books, mentoring, and on-the-job experience.

Throughout the year, the employee receives feedback from colleagues, supervisors, internal customers, and direct reports. Evaluations are based on the achievement of individual and team results, and positive efforts are rewarded through compensation, career advancement, specialized development opportunities, and recognition.

In 2015, 100% of our salaried employees participated in the performance management process, and almost 98% received a formal performance rating at the end of the year.

Leadership Development

To ensure our leaders have the capabilities needed to drive high performance and accelerate change, we offer a number of leadership development programs that are a combination of global, regional, and functional events and specialized learning opportunities for high-potential employees.

Advancing Supervisory Excellence focuses on the development of our almost 6,000 frontline operations leaders. Since 2011, participants have been developing skills in providing feedback, building trust, coaching, resolving conflict, communicating, leading change, building inclusive work teams, and understanding operational finances. In 2015, we refreshed the program to provide more flexibility in course delivery and for integration into the frontline supervisor onboarding programs across all of our facilities.

Our Leadership Fundamentals Program, Advanced Leadership Program, and Executive Development Program are global resident programs taught by our current leaders for our future leaders. Participants must be identified as top talent, nominated by their business leaders, and approved by our executive leadership.

During these multi-day programs, participants are immersed in learning within the leadership framework themes and are provided with both group and one-on-one coaching. Ongoing coaching and follow-up on learning outcomes continue after the program. In 2015, there were 124 participants and 28 leaders as teachers in the global Alcoa Academy programs.

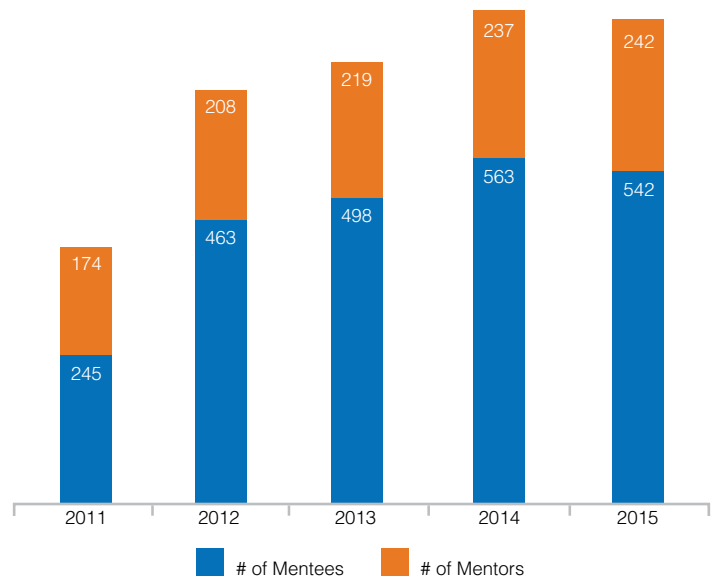
Our Technical Emerging Leaders Education Development Program caters specifically to developing leadership skills in emerging leaders in technical functions. Three weeks of training are spread across nine months, culminating with an action learning project using the tools and knowledge learned. We had 32 participants in this elite program in 2015.

Other leadership development programs in 2015 included two sessions of the EHS Leadership Development Program, a three-and-one-half-day accelerated program for leaders in environment, health, safety, and sustainability roles globally. Our European Regional Leadership Development Program hosted participants from across our European locations and guests from our joint venture with Ma'aden Aluminum Company in Saudi Arabia.

Alcoa Mentoring Program

The Alcoa Mentoring Program is used as a development tool for top talent in our senior manager ranks. In 2015, we had 542 mentoring relationships supported by 242 mentors. Based on program feedback solicited in 2014, the focus for 2015 was providing tools and tips to program participants to improve the quality of the interactions between mentors and mentees.

Alcoa Mentoring Program



AlcoaLearn

Our online learning management system, known as AlcoaLearn, provides employees with the learning resources they require and tracks their training progress. It is available 24/7 and in 22 languages.

In 2015, the system housed almost 102,000 online courses and supported the administration of 55,096 instructor-led courses. This represents 295,640 global training hours during the year.

2015 Training

Delivery Method	Courses	Hours
Online/Virtual/Other	101,891	80,541
Classroom	55,096	215,099
Total	156,987	295,640
Per Employee	2.6	4.9

Advance

We advance talented employees primarily by strengthening our succession pipeline.

In 2015, we continued our newly developed functional talent reviews that identify successors and individuals ready for available development opportunities. These reviews:

- Familiarize leaders with top talent and provides visibility into the talent pipeline across the company;
- Provide visibility to top talent in need of new opportunities; and
- Provide a forum to discuss talent challenges and development opportunities.

The functional reviews feed into business and resource unit reviews, which ultimately roll up to a review by our chief

executive officer and his lead team and then a separate review with the entire Alcoa Executive Council.

In 2015, the process enabled the identification of successors that are ready now or in one to three years for 97% of our 364 most critical roles.

LABOR RELATIONS

We believe in freedom of association no matter where we operate around the globe.

Each year, we negotiate labor agreements with various unions. In 2015, we had more than 105 such agreements that covered 62% of our global workforce. Examples include the following:

- In Australia, 66% of our Alcoa of Australia employees were covered by enterprise bargaining agreements that are certified by Fair Work Australia.
- Collective bargaining agreements were in place for more than 90% of our workforce in Europe.
- In the United States, 56% of the hourly workforce was covered by collective bargaining agreements, including

a five-year master labor agreement with the United Steelworkers union that was ratified in June 2014. This agreement covers 34% of our hourly workforce in the United States.

- Five standalone agreements covered 76% of our hourly employees at our nine plants in Canada.
- We had eight standalone agreements in Brazil that covered 100% of our union-represented workforce.

In addition to unions, more than 80% of our hourly workforce around the world is represented by health and safety committees at our locations. These committees help engage these employees in the development of work practices, programs, and education efforts that promote a healthy work environment.

Related Information

- [Human Rights](#)

[Back to index](#)

CASE STUDY

Teaching the Teachers: Boot Camp Underscores Manufacturing Careers

Teachers can have significant influence on the career choices of their students, and an innovative program designed, led, and coordinated by our Warrick Operations location (Indiana, USA) is giving educators the knowledge they need to encourage students to consider a career in manufacturing.

Supported through an Alcoa Foundation grant, the Teachers' Manufacturing Bootcamp is a free, two-week program offered to area teachers to give them hands-on instruction and experience in manufacturing. During the program, participants rotate between Warrick Operations, three other manufacturing locations, and educational institutions.

The rigorous curriculum covers manufacturing safety, quality, lean manufacturing, process management, and reliability excellence. Participants also learn about job responsibilities, wages, work conditions, and career potential as they visit each of the four manufacturing facilities.

Thirty teachers participated in the first boot camp in 2015, receiving a weekly stipend of US\$550 and graduate-level credit from Oakland City University. Another 30 teachers will attend in 2016.

A participant in the 2015 camp commented, "My impression of what a manufacturing job entails was drastically changed from a mindless and repetitious single task to a career that entails a lot of teamwork, problem solving, and paths for advancement through training and initiative."



A teacher receiving hands-on instruction

Creating a Safety Culture Where Zero Is Possible

- We had four employee fatalities and one contractor fatality in 2015.
- Our lost workday rate was 0.10; our days away, restricted, and transfer rate was 0.31; and our total recordable incident rate was 1.08.
- Since 2013, we have given more than 36,000 Alcoa STOP coins to employees for their proactive safety efforts.

We believe zero work-related injuries and illnesses is possible.

We have created a world-class safety culture that values human life above all else and consistently delivers incident rates that are significantly below industry averages. This accomplishment requires the commitment of not only our leaders but also our employees, who are empowered to take personal responsibility for ensuring their safety and that of their coworkers—even if that means stopping work when they feel unsafe or unsure. To bring additional focus, we include an annual safety target as a component of our variable compensation plan.

In 2015, the following four employee fatalities and one contractor fatality overshadowed all of our safety results:

- Feb. 12: An employee at our Baie Comeau smelter (Canada) was struck by two large panels of the main relining shop door while it was being repaired.
- Feb. 23: At our Tennessee Operations (USA), an employee was attempting to trolley the last coil of the shift when he was subsequently caught in a pinch point between a support structure on the trolley and the crane cab frame.
- Aug. 15: An employee was performing a routine task on foot in the furnace area of the casthouse at our Deschambault smelter (Canada) when he was struck from behind by a fork truck.
- Nov. 25: At our Kwinana refinery (Australia), a maintenance contractor entered a digester tank and fell approximately 20 meters (66 feet).

CASE STUDY

Focused Programs Reduce Hand-related Injuries

Many operations within Alcoa require manual manipulation of products and materials, which can lead to hand-related injuries. Automation, new processes, and changes in human behavior are just some of the ways in which our locations are reducing or eliminating the risk.

Canada

After analysis of safety incidents at our Bécancour smelter in Canada revealed that approximately 40% of injuries in the casthouse in 2013 and 2014 were hand-related, the location set a strategic target—a 25% reduction in casthouse hand injuries.

The smelter's project team used Six Sigma methodology to track and analyze



Hand protection at Bécancour smelter

data on hand incidents, leading to stop-and-look-help criteria and specific corrective measures. The team next identified the most likely causes for hand injuries—lack of operator experience, inadequate use of individual protective equipment, and inconsistent knowledge of good workplace practices—and implemented appropriate corrective measures.

The result—a 59% reduction in casthouse hand injuries.

United States

The number one risk for serious hand and finger injuries within Alcoa Power and Propulsion (APP) historically was manual hand cutting.

The APP location in Dover, New Jersey, USA, formed a cross-functional team to perform safety observations and implement engineered solutions to eliminate the need for operators to place their hands next to a cutting wheel. Using repurposed or existing automation equipment, the team eliminated manual cutting on more than 40 high-volume products, which amounts to an average of 1,800 fewer manual cuts per day.

- Dec. 13: An employee at our Itapissuma location (Brazil) had his left arm pulled into the point of operation between drive rolls on a coating line.

We conducted a thorough investigation into each fatality and communicated our findings to all of our locations.

During the year, we maintained or reduced each of our major incident rates—lost workday; days away, restricted, and transfer; and total recordable incident. At the end of 2015, 79.1% of our locations had worked 12 consecutive months without a lost workday, 48.7% without a days away, restricted, and transfer incident, and 44.4% without a total recordable incident.

Fatalities

Employees and supervised contractors/ non-supervised contractors

	Global	Asia	Australia	Europe	North America	South America
2011	0/1	0	0	0/1	0	0
2012	2/0	0	0	0	2/0	0
2013	0	0	0	0	0	0
2014	0/1	0	0	0	0/1	0
2015	4/1	0	0/1	0	3/0	1/0

Lost Workday Rate

Employees and supervised contractors

	Global	U.S. Manufacturing Average	Asia	Australia	Europe	North America	South America
2011	0.12	1.1	0.06	0.39	0.16	0.12	0.07
2012	0.13	1.1	0.27	0.47	0.10	0.12	0.07
2013	0.09	1.0	0	0.32	0.06	0.07	0.09
2014	0.10	1.0	0.11	0.35	0.05	0.10	0.04
2015	0.10		0	0.17	0.07	0.11	0.09

The 2015 Bureau of Labor Statistics U.S. manufacturing industry average is not available. Lost workday rate represents the number of injuries and illnesses resulting in one or more days away from work per 100 full-time workers.

Days Away, Restricted, and Transfer Rate

Employees and supervised contractors

	Global	U.S. Manufacturing Average	Asia	Australia	Europe	North America	South America
2011	0.78	2.4	0.40	1.46	0.56	0.90	0.36
2012	0.50	2.4	0.37	1.41	0.27	0.60	0.21
2013	0.35	2.2	0.15	0.96	0.19	0.37	0.22
2014	0.32	2.2	0.11	0.65	0.16	0.38	0.16
2015	0.31		0	0.39	0.20	0.38	0.11

The 2015 Bureau of Labor Statistics U.S. manufacturing industry average is not available. 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.

Total Recordable Incident Rate

Employees and supervised contractors

	Alcoa	U.S. Manufacturing Average
2005 Baseline	1.48	5.6
2011	1.24	4.4
2012	1.07	4.3
2013	0.98	4.0
2014	1.14	4.0
2015	1.08	
2020 Goal	0.68	
2030 Goal	0.19	

Goal: 0.68

Progress: As of Dec. 2015 **1.08**

The 2015 Bureau of Labor Statistics U.S. manufacturing industry average is not available. Total recordable incident rate represents the number of injuries and illnesses resulting in days away from work, job transfer or restriction, medical treatment, or other recordables per 100 full-time workers.

Comprehensive safety data, including by region and gender, is provided in the appendix.

Approach to Safety

Our approach to safety focuses on four main activities:

- Identifying hazards and assessing the risks associated with our products, services, and operations;
- Developing and implementing both design and operational controls with built-in layers of protection to mitigate the impact of those risks;
- Monitoring and maintaining our hazard recognition, risk assessment, and operational control activities to ensure they are current and effective; and
- Reacting to correct gaps in our protective systems and continuously improving system stability.

Identifying Hazards and Assessing the Risks

We expect each location to proactively identify and eliminate potential hazards in the workplace, going beyond regulatory compliance and looking for ways to reduce the exposures most likely to result in injury. When hazard elimination is not technically feasible or is extremely impractical, we strive to minimize the likelihood or severity of the exposure.

Developing and Implementing Operational Controls

Operations and activities are controlled to ensure both personnel and process safety. Our procedures extend beyond our employees and operations to include both contractor and product safety.

Every business unit is also required to ensure that each of its locations develops, implements, and maintains written emergency response plans to protect not only our employees and contractors, but also the communities where we operate.

Our emergency response plans are supported by the required resources, including emergency response

equipment and trained personnel. The plans must include specific roles, responsibilities, procedures, and equipment for the detection, communication, prevention of, and response to emergency situations.

Based on risk, many operating location emergency response plans will define protocols for workplace and community medical treatment; fire and explosion; severe weather; evacuation and rescue; facility and personnel security; and accidental release of substances potentially harmful to human health or the environment.

Monitoring and Maintaining Systems

Monitoring and maintaining our hazard recognition, risk assessment, and operational control activities to ensure they are current and effective requires us to select the appropriate performance indicators and monitor and track performance against them.

We track key performance indicators for each business unit and operating location. Periodically, we validate their effectiveness in measuring and monitoring our overall safety performance.

Reacting to Correct Gaps and Improving System Stability

When a safety or other protective system is not in conformance, business units and locations are expected to initiate a corrective action process that, at a minimum, involves the following:

- Investigate the alleged nonconformance and determine its validity;
- Assess the potential impact and prioritize the follow-up based on the risk;
- Conduct a causal factors analysis and take corrective and preventive action; and
- Verify to ensure corrective actions are implemented.

Alcoa's **Executive Council** reviews our enterprise risk-management process each year. The review process is designed to ensure the continued suitability, adequacy, and effectiveness of the organization's overall enterprise risk management and includes significant risks for both personnel and process safety.

Fatality and Injury Elimination

Our most important responsibility as a company is having every employee and contractor return home safely at the end of each workday.

CASE STUDY

Creating a Clear Path to Reducing Mobile Equipment Risks

The interface of mobile equipment and pedestrians is one of Alcoa's top fatality risks, and locations around the world are implementing new technology and processes to reduce or eliminate the need for man and machine to cross paths.

Brazil

During initial construction of a new bauxite residue storage area at our Alumar refinery in São Luís, the project logged 14 safety incidents involving mobile equipment that resulted in material damage only.

To transfer classroom learnings to the job and simulate real-life situations, the location created a model of the entire construction site complete with scale-sized mobile equipment. Trainers and operators used the model to review safety procedures for typical activities, such as parking and excavating. No additional mobile equipment incidents occurred during the project.

Hungary

The biggest safety risk at our Székesfehérvár plant was employees being unaware they were in the vertical drop zone of an overhead crane that was transporting material.

The location conducted a series of improvement events involving operators, engineering, maintenance, and safety experts. The solution—install blue LED lights on the crane



Blue lights alert employees to a crane's drop zone.

hooks to project the vertical drop zone onto the plant floor to alert employees.

United States

At our Lancaster Works in Pennsylvania, crane operators had to walk along a shared mobile/pedestrian equipment aisle 6.5 hours a day to deliver ingot to a hot mill. After two serious overhead crane incidents, the location installed an automated crane system that allows operators to remain stationary in a protected location while the virtual barriers developed for crane movement and demarcation safely guide the overhead crane loads to their destination. The solution eliminated 991 kilometers (616 miles) of walking and 2,320 hours of mobile/pedestrian interfaces annually.

Fatalities and injuries often have multiple causes that involve many people operating at different levels of knowledge and experience. Most fatal and serious incidents generally involve a breach of our technical, process, leadership, or organizational defenses.

To overcome this, we have instilled a safety system and culture that enable our employees to:

- Recognize hazards and error-likely situations;
- Implement tested and safe methods for performing job tasks;
- Improve the effectiveness of pre-task safety briefings;
- Stop work until an identified hazard can be eliminated or controlled;
- Provide layers of protection from recognized hazards;
- Apply lessons learned to predict areas of current and future vulnerability;
- Monitor for potential deviations from safe and proven methods; and
- Address contractor and contracted services safety.

We minimize our fatality and injury risks by equipping our employees with the tools and knowledge they need to perform their jobs safely. The following are some key initiatives.

Fatal and Serious Injury (FSI) Prevention

The FSI Prevention initiative is designed to help all locations better predict and prevent significant and fatal injuries through improved reporting, analysis, and communication of actual and potential incidents.

An incident is designated an FSI based on the potential for a significant injury or fatality, whether or not either occurred. Encouraging employees to report incidents that did not lead to a life-threatening or life-altering injury or illness—but had the potential to do so—raises the level of their engagement in FSI prevention and promotes proactive risk recognition and response.

In 2015, our employees reported 12 FSI incidents.

Human Performance

Our locations around the world also have implemented human performance, which focuses on the way people, programs, processes, work environment, organization, and equipment work together as a system. It teaches employees how to anticipate and recognize error and error-likely situations to predict, reduce, manage, and prevent fatalities and injuries from occurring. It also teaches how to avoid error traps, which are conditions or situations that people may fall into without recognizing it and are proven through research to be leading causes of injuries.

Human Performance



Automation and Technology Forum

In October 2015, more than 60 of our health and safety professionals and technology leaders from across the world participated in the Automation and Technology Forum held at Alcoa Technical Center. The goal was to evaluate how emerging technologies and automation applications—some of which are already in use in some of our locations—could improve our risk profile and incident prevention efforts.

Internal and external experts from Caterpillar, ABB Robotics, the National Robotics Engineering Center, and Carnegie Mellon University highlighted new and emerging technologies. These included:

- An automated forging inspection process, which reduces touch time with metal, increases throughput, and improves quality.
- New hands-free casting technology to eliminate ingot head skimming and automate the start of the cast, reducing the likelihood of aluminum explosions and removing operators from the line of fire.
- Deployment of robots for sampling molten metal alloys in crucibles, removing operators from working around molten metal while enabling them to refocus their efforts on more value-added activities with fewer safety risks.

Employee Engagement

Employee engagement is one of the most important factors in creating and sustaining a safe work environment. Our efforts in this area include safety suggestion systems, problem-solving teams, pre-job briefings, toolbox meetings, safety committees, and individual accountability for specific aspects of safety.

Our Stop for Safety Coin Campaign has also been a driver of employee engagement. The initiative encourages and recognizes employees who stop themselves or a colleague and seek help if they believe the situation is unsafe or they are unsure of the potential outcome.

The campaign reinforces to our employees that they have the authority to stop work when they perceive a potentially unsafe situation—regardless of the circumstances—and will be supported by management. We feel the more stops that occur, the better, even if many end up not being unsafe situations.

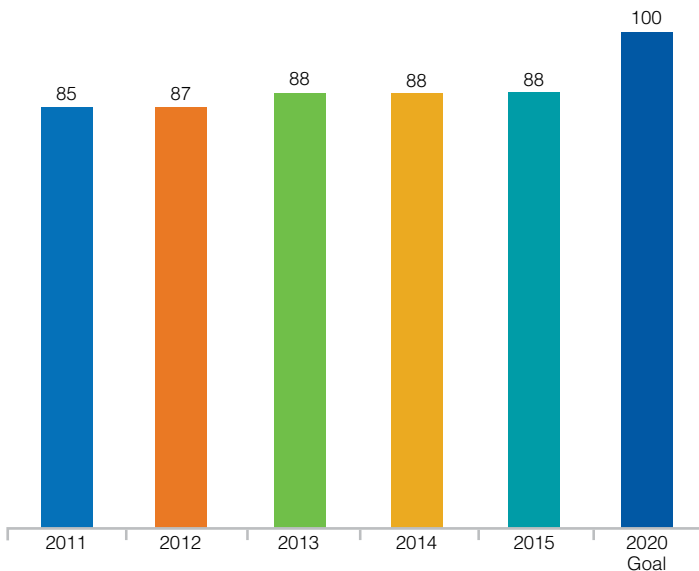
Since the program’s launch in 2013, we have given more than 36,000 Alcoa STOP coins to employees for their proactive efforts, including the following in 2015:

- A U.S. employee stopped work when he suspected the equipment he was using was damaged. After inspecting the machine, his crew leader confirmed a broken weld.
- In the United Kingdom, an employee noticed movement in the top die of an eight-ton hammer and stopped work. An investigation determined that the top dowel, which positions the die, had sheared in half due to a tooling misalignment.
- Unusual noises from the equipment he was operating made an employee from Hungary stop and seek help. Failed tooling was determined to be the source.
- In Germany, an employee stopped work when he noticed several drain cover plates were damaged and could break when forklifts or other mobile equipment passed.

We measure our employees’ engagement in, and satisfaction with, our safety efforts via our annual Global Voices employee survey. In 2015, the highest-scoring statement in the survey (a favorable score among 92% of participants) was “If I see a situation that is unsafe, I can stop work.” The second safety statement, “I work in an environment that promotes safety,” had an 88% favorable score.

Employee Safety Engagement

Percent of employees indicating they work in an environment that promotes safety



Safety Self-assessments

Each of our locations must periodically conduct a safety self-assessment to help pinpoint areas requiring improvement.

Alcoa Self Assessment Tool Rating

Percent of locations receiving a “Good” or better self-audit score

Category	2011	2012	2013	2014	2015	Goal
Fatality Prevention	91	91	92	94	97	Achieve a sustained rating of 100% “good” or better by 2020.
Confined Space Entry	97	95	94	97	99	
Mobile Equipment Safety	95	92	95	97	98	
Fall Prevention	90	94	96	94	93	
Lock/Tag/Verify	95	95	98	99	96	
Molten Metal Safety	69	71	79	79	89	
Combustible Dust/Particulate Safety	77	73	71	61	57	
Electrical Safety	83	90	93	91	88	
Contractor Safety	94	93	96	99	98	
Machine Safeguarding	71	84	92	90	93	
Combustion Safety	51	66	77	82	87	

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. Our standards for combustible dust and particulate safety were revised in 2013, which in part resulted in new gaps versus expectations for a number of locations.

Related Information

- Health section ([page 39](#))
- [Zero Is Possible](#) View up-to-the-minute and monthly statistics on Alcoa’s progress toward zero injuries and illnesses.

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Advancing Employee Health and Wellness

- Our goal is to ensure the health and wellness of our employees while eliminating or reducing, to the fullest extent possible, all health hazards.
- For the third year in a row, we were named the world's most active organization by the Global Corporate Challenge.

We are committed to creating a work environment that protects the health of our employees while also empowering them with the tools, resources, and support they need to live healthy lives. That commitment also extends to the communities where we operate and the customers who use the products we produce.

We have been an industry leader in establishing health standards, often implementing more stringent requirements than those specified by applicable law. We also proactively identify and respond to emerging health-related trends in our industry and have established a long-standing relationship with the Health Committee of the [International Aluminium Institute](#).

HEALTHY WORKPLACE

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

The health hazards inherent in our diverse operations may include chemical, physical (noise, ergonomic, radiation, heat, and vibration), or other types of hazards. We have

spent decades implementing processes, procedures, equipment, and technologies to mitigate these risks and have made significant progress as demonstrated by our incident rates, which are well below industry averages.

In 2015, our priority focus areas were exposure assessment for biological agents and hearing conservation.

Biological Agent Exposure Assessment

Our focus on biological hazards in 2015 arose from a periodic review of our health programs and inquiries from locations regarding the various types of bacteria, such as *Legionella*, that occasionally are identified in our building water systems. Further stimulating interest was an outbreak of Legionnaires' disease that occurred midyear in New York, New York (USA).

In collaboration with external experts, our corporate health team updated our guidelines on *Legionella* risk management. This document also serves as a helpful guidepost for similar bacterial contaminants in building water systems.

All operating locations were also tasked with ensuring that biological agents are included in their exposure assessments.

CASE STUDY

Turning a REACH Regulation Challenge into an Opportunity

Rather than approaching chemical regulation as a challenge, Alcoa Fastening Systems & Rings Europe turned it into an opportunity to strengthen its hazardous materials management, eliminate hazardous materials in its processes and products, and reduce health risks in its workplaces.

Implemented in late 2006, the Registration, Evaluation, Authorisation, and Restriction of Chemicals (REACH) regulation controls the use of chemical substances within the European Union. To ensure adherence to the regulation, Alcoa Fastening Systems & Rings Europe created—and reviews each month—a centralized database of all

chemicals used throughout its locations. This increased visibility has strengthened the business' management of the hazardous materials.

AFSR Europe is also working to eliminate its use of the most strictly regulated chemicals through product substitution, process changes, and new technology. The business has completely eliminated dibutyl phthalate and trichloroethylene in its processes and products and no longer uses diethylhexyl phthalate at its locations. Additional chemicals are being evaluated for elimination.

By eliminating these hazardous materials in its workplaces, Alcoa Fastening Systems & Rings Europe has reduced its occupational health risks and environmental footprint.

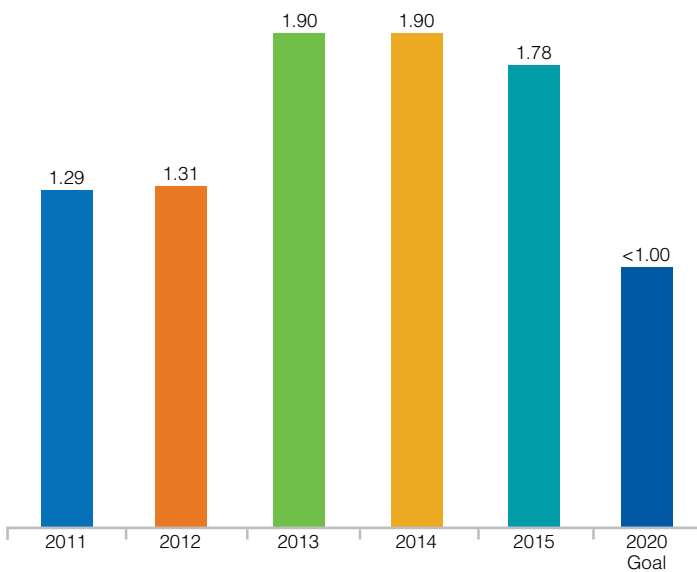
Hearing Conservation

Many of our manufacturing processes are noisy due to the quantity and scale of the equipment that we use, with approximately 54% of our employees potentially working in high-noise environments. We have strict standards in place regarding the use of hearing protection and zero tolerance for noncompliance.

All of our locations monitor, track, and report on the total hearing shift rate of their workforce. This indicator captures all confirmed age-corrected 10-decibel hearing shifts, regardless of cause, among tested employees, with a 2020 goal of less than 1% for the annual rate of total hearing shifts. In 2015, our global rate was 1.78%.

Total Hearing Shift Rate

Percent



The significantly higher rates starting in 2013 reflect a maturing database, as well as an adjustment in methodology for calculating this rate.

Our locations are actively working to eliminate or reduce noise in their operations. At our bauxite mine in Juruti, Brazil, for example, quantitative assessments conducted in 2015 revealed that aging equipment resulted in employees being exposed to sound that exceeded 85 decibels—an unacceptable level. To reduce exposure and minimize the need for hearing protection, the location revised work practices to limit the time employees remained close to the noise sources. This included providing a dedicated room where tasks could be carried out in a noise-free environment. As a result of these actions, the number of employees exposed to noise exceeding 85 decibels declined from 45 to 19.

Fifteen of our U.S. facilities have participated in a multi-year study by the U.S. National Institute for Occupational Safety and Health to identify effective means to prevent hearing loss and create hearing conservation program tools and recommendations. Data gathering was completed at the locations in 2015, with the results expected to be published in 2016.

Health and Safety Committees

It is important to engage our employees in the development of work practices, programs, and education efforts that promote a healthy work environment. More than 80% of our hourly workforce around the world is represented by health and safety committees.

In the United States, Alcoa and the United Steelworkers union jointly sponsor an annual health and safety meeting to address the root causes of workplace fatalities, injuries, and disease. Approximately 45 employees and union representatives attended the 15th such meeting in March 2015.

Health Research

To identify correctable causes of injury and chronic disease, we sponsor research through partnerships with medical experts at Stanford University and Yale University. Our internal Alcoa Health Research Team works closely with our external Occupational and Environmental Health Advisory Council to translate these and other research findings into policies.

The team also continuously monitors the scientific literature for relevant, new information and voluntarily initiates stricter environmental, health, or safety controls whenever credible evidence warrants, as well as removing them when it does not.

HEALTHY EMPLOYEES

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

Alcoa Global Wellness Initiative

Launched in 2012, the Alcoa Global Wellness Initiative focuses on the most important issues for our employees—physical activity, nutrition, tobacco usage, and well-being. Corporate-sponsored company-wide programs are supplemented by thousands of location programs and events, which are specifically designed to address local needs, community expectations, and cultural relevance.

Key achievements and activities in 2015 included the following:

- We expanded our global wellness infrastructure to more than 200 locations and 300 wellness leaders.
- For the third year in a row, we were named the world's most active organization by the Global Corporate Challenge. Approximately 21,000 employees participated in the challenge, logging a collective 24 billion steps.
- More than 8,200 employees in the United States underwent onsite or physician-provided biometric screenings to identify potential health issues.

- Employees completed more than 9,600 heart-health assessments using the PROCAM health risk calculator.
- We conducted our third global tobacco-cessation campaign.
- The 955 participants in our first Lighten Up challenge lost an average of 5.6% of body weight and more than 4.5 metric tons. We offered a second challenge in late 2015, with 665 participants losing an average of 4.31% of body weight and more than 2.2 metric tons. An Alcoa team was the first-place finisher in both global challenges.



The EHS Monarcas team from Howmet de Mexico in the Global Corporate Challenge

One measure of the success of our wellness effort is the annual Global Voices employee survey. In 2015, the statement “The health and wellness activities at my location promote employee personal health” received an 84% favorable response rate. This exceeded the 77% best-in-class rate for all companies, as well as the 83% response rate in 2014. Our goal is 100% by 2020.

Occupational Medicine

Regardless of the size of their location, all of our 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 2015, we had 334 occupational disease cases reported among our workforce, with an occupational disease rate of 0.77 reported illnesses per 100 full-time employees. Reported illnesses can include respiratory disease, infections, skin disease, hearing loss, cancer, pneumoconiosis, and heat-related illnesses.

Occupational Disease Rate

Employees/supervised contractors

	Global	Asia	Australia	Europe	North America	South America
2011	0.66	0.34	0.97	0.18	0.94	0.13
2012	0.66	0.85	0.82	0.77	0.63	0.39
2013	0.49	0.10	0.89	0.35	0.59	0.10
2014	0.54	0	0.85	0.15	0.77	0.03
2015	0.77	0	1.25	0.25	1.00	0.18

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

Non-supervised contractors

	Global	Asia	Australia	Europe	North America	South America
2011	0.13	0	0.31	0.04	0.08	0.11
2012	0.10	0	0.14	0	0.10	0.06
2013	0.13	0.61	0.40	0	0.22	0.06
2014	0.04	0.80	0.11	0	0.03	0.00
2015	0.10	0	0.32	0.06	0.25	0.24

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
2011	366	54	17	1
2012	347	75	11	3
2013	275	38	18	1
2014	291	41	5	0
2015	380	54	21	2

Pandemic Preparedness

As a global company, we must be prepared to help protect our employees from outbreaks of serious illness and disease occurring in the communities where they live and work.

Building upon our efforts to address the Ebola outbreak in Guinea in 2014 and 2015, [Alcoa Foundation](#) supported the training of 185 health care providers in the Boké prefecture in the control and management of infectious diseases. The country is strained by a high prevalence of other infectious diseases beyond Ebola, such as malaria, pneumonia, and HIV/AIDS. International nonprofit [Jhpiego](#) delivered the five-day training program in 2015.

In November 2015, our San Ciprián facility in Spain conducted an emergency drill simulating a chemical leak in a vessel at its port. The evacuation and decontamination activities practiced during the drill are similar to, and built

upon, those in place to handle incidents involving infectious diseases. A number of our locations deployed such activities in response to the recent Ebola outbreak.

Management of Chronic Illness

We maintain a global health standard that enables and supports employees living with chronic diseases, including life-threatening and transmittable diseases like HIV and AIDS, to continue to pursue active careers. The employees must be physically capable of working, able to perform their assigned duties in an acceptable manner, and not present a direct threat to the health and safety of themselves or others at work.

Reasonable accommodations to the physical needs of these employees are made on a case-by-case basis and, at a minimum, meet all applicable legal requirements. The standard also addresses issues of reasonable accommodation, coworker education and counseling, and confidentiality.

COMMUNITY ENGAGEMENT

The Alcoa Community Framework is an important tool that we use to determine, among other items, the health needs and concerns of our community stakeholders. The framework

requires locations to provide metrics related to air quality, water quality, noise, and community health—all of which could impact the health of our neighbors.

Alcoa Foundation often fills an identified gap through grants to nonprofit organizations that are addressing specific health needs in the community. Projects receiving foundation support in 2015 included:

- Australia: The delivery of vital health services to the disadvantaged youth of Pinjarra, Waroona, and Dwellingup.
- Canada: A training program focused on healthy relationships for children exposed to domestic violence.
- Hungary: Development of the country's first dysphagia center to treat patients with swallowing disorders.
- Russia: Health evaluations and healthy lifestyle education to improve the health of young people in the Samara region.
- United States: Free breast, cervical, and ovarian cancer screenings for low-income and uninsured women.

These and other community programs that we support underscore that our health responsibility extends beyond the borders of our facilities and into the communities that surround our operations.

CASE STUDY

Partnership Helps Guinea Health Facilities Manage, Control Infectious Diseases

More than 180 health care providers at three medical facilities in Guinea's Boké prefecture are better prepared to control and manage infectious diseases after completing a five-day training program delivered in 2015 by international nonprofit [Jhpiego](#) and supported by [Alcoa Foundation](#).

The latest outbreak of the Ebola virus in Guinea underscored the necessity for increased infectious disease preparedness among the country's health care network. The three Boké medical facilities that participated in the training serve approximately 207,000 people, or 45% of the population in the prefecture.

"Before the Jhpiego project, my staff and I did not have any training on infection prevention and the control and management of infectious diseases," said Dr. Solange Kamano, health director for the Boké prefecture. "Previously, our health care providers thought that infection happened to others. Their behaviors have changed a lot. We can proudly say that the prefecture level of preparedness is now very high."

Guinea is strained by a high prevalence of infectious diseases, such as Ebola, malaria, pneumonia, and HIV/AIDS. In addition, inadequate facilities and shortages in human

resources and supplies further complicate the public health challenge.

Training for the 185 Boké health care providers covered more than 10 key topics, including an overview of infectious diseases, hand hygiene, personal protective equipment, operating room procedures, waste management, and decontamination. Pre- and post-testing of participants, action plans to close practice gaps, and follow-up site visits by the trainers helped ensure the learnings were put into practice.



Hand hygiene training

CUSTOMER HEALTH/PRODUCT SAFETY

Key goals that drive our efforts to ensure customer health and product safety include:

- Assuring health integrity in product safety and stewardship;
- Championing outstanding science, toxicology, and risk assessment;
- Partnering with other key stakeholders to promote synergy;
- Engaging regulators as appropriate; and
- Challenging misguided/bad science with best available scientific research.

In support of these goals, we have a Product Safety Standard to identify what is required for product safety management systems developed by our businesses. The standard includes requirements for raw material sources, production practices, chemical composition of our products, and communication of risks associated with use or abuse of these products.

We also provide [safety data sheets](#) and other documents that communicate information on the proper use, reuse, and/or disposal of our products. These sheets include the potential health risks associated with use and misuse of these products and the precautionary measures that can be used to reduce or eliminate these risks.

In 2015, we completed updating more than 3,300 safety data sheets and product labels to conform to the United Nations' Globally Harmonized System of Classification and Labelling of Chemicals. This included updating the European versions of our safety data sheets to comply with the Classification, Labelling and Packaging Regulation (EC) No. 1272/2008.

Related Information

- Safety section ([page 34](#))
- [Zero Is Possible](#) View up-to-the-minute and monthly statistics on Alcoa's progress toward zero injuries and illnesses.

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Supply Chain

Driving Sustainability into the Supply Chain

- We build relationships with suppliers who behave in a responsible and sustainable manner.
- We rated 62% of our key suppliers as either leading or active in regards to their sustainability programs in 2015.
- We continued to implement a third-party supplier due diligence program.

Sustainability within our supply chain is a reciprocal relationship. Our suppliers help us achieve our sustainability goals, and we help them drive sustainability into their processes and practices.

As a global company, we enter into relationships and conduct business with thousands of suppliers who are required to behave in a responsible and sustainable manner. Our interactions with them are based on the highest standards of integrity and compliance with all relevant laws and regulations.

In 2015, we spent US\$18.2 billion to procure services and materials, taking into consideration their environmental, social, and economic impacts.

2015 Spend and Suppliers by Region

Region	Procurement Spend <i>Billions of U.S. dollars</i>	Supply Base Composition <i>Percent of total supply base</i>
Asia	0.6	3.2
Australia	1.9	7.6
Europe	4.5	26.7
North America	9.7	50.5
South America	1.5	12.0
Total	18.2	100.0

Global Supplier Sustainability Program

We continued to increase the sustainability of our key suppliers in 2015 through our Global Supplier Sustainability Program. These suppliers include companies that 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](#), which underwent a significant update in 2015.
- 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. In 2015, 62% were rated as either leading or active, with the remaining 38% in the emerging and lagging categories.

- 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.

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.	<ul style="list-style-type: none"> ● Labor practices ● Health and safety programs ● Business ethics policies ● Community commitment programs ● Risk management <ul style="list-style-type: none"> ● Financial management ● 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.	<ul style="list-style-type: none"> ● Value systems ● Participation in sustainability indexes or reporting frameworks ● Incorporation of sustainability into market strategy ● Life cycle advantages/disadvantages of key products
Suppliers measure performance and establish quantifiable environmental goals; progress on environmental goals publicly disclosed.	<ul style="list-style-type: none"> ● Environmental goals and metrics ● Recycling programs ● Measurements systems ● Public disclosure/third-party assurance

Supplier Assessment Results

Percent of key suppliers

Maturity Rating	2011	2012	2013	2014	2015
Leading	16	17	18	16	18
Active	52	57	60	67	44
Emerging	22	18	19	15	23
Lagging	10	8	3	2	15

A 28% increase in the number of suppliers assessed in 2015 led to a decrease in active ratings and an increase in both emerging and lagging ratings.

We continued implementing a third-party supplier due-diligence program with our supplier base during 2015. This program helps us 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.

More than 47% of our targeted suppliers were registered in the program at the end of the year, and we will continue to drive compliance throughout our supply base.

Related Information

- [Supplier Standards](#)
- [Ethics and Compliance Program](#)
- [Human Rights](#)
- [Conflict Minerals Disclosure and Report–Form SD](#)

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Stakeholder Engagement

Bringing Transparency to Stakeholder Engagement

- The Alcoa Community Framework strengthens relationships with key stakeholders.
- We recognize the value that non-governmental organizations deliver to society and seek to partner with these institutions.

We believe it is important to have transparent and regular dialogue with all of our stakeholders to ensure a mutual understanding of issues, concerns, and opportunities. Stakeholder engagement is also an important element in the process we use to determine our material sustainability aspects.

Our stakeholders include shareholders and lenders who provide our financial capital; our customers, suppliers, and employees; the people who live in the communities where we operate; the public agencies that regulate our businesses; government representatives; and the non-governmental organizations that are interested in what we are doing. (View a partial list of our stakeholders in the appendix.)

Our stakeholder relationships are both formal and informal. With customers, suppliers, government agencies, employees, lenders, and shareholders, 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.

Stakeholder Engagement Process

The Alcoa Community Framework is the principal way we manage and measure our engagement with stakeholders at the community level.

The framework helps each of our locations define the stakeholder groups with which to engage and identifies tools and

approaches to ensure that engagement with these stakeholders is robust, effective, and transparent. It also accommodates the differing sizes and stakeholder engagement needs of our facilities and accurately measures and compares their efforts.

Each year, a location completes a dashboard that evaluates its progress on five key engagement levers (public strategy plan, communications, stakeholder engagement, community partnerships, and employee engagement), taking into consideration its activities around environment, infrastructure, policy, and community relationships.

As part of the framework, many of our locations have formally established community advisory boards (CABs) comprising external community members, NGO leaders, and local officials who are well-versed in the needs of their local communities. CABs meet regularly to provide open, two-way communication, ensuring that all challenges and opportunities are discussed and responded to quickly.

Although the intent is for issues and concerns to be resolved at the location level, occasionally they are discussed at the regional or global level within the company depending upon the issue or the identified risk or opportunity. We also develop relationships with appropriate stakeholders at the regional and global levels.

The following key issues were raised by, or discussed with, stakeholders in 2015.

2015 Stakeholder Issues

Location	Issue	Action
Global	In September 2015, we announced a plan to separate into two companies—a globally competitive Upstream company and a Value-Add company consisting of our midstream and downstream businesses. The separation is expected to occur in the second half of 2016.	We conducted extensive engagement with employees through a dedicated separation website and newsletter, ongoing emails, global town hall meetings with our CEO and other top leaders, and more. Other stakeholders with whom we engaged through various means included the media, unions, and investors.
Alcoa of Australia	The Australian Conservation Foundation released a report examining the top 10 greenhouse gas (GHG) emitters in Australia. The report used the latest publicly available GHG emissions data for each company. Alcoa of Australia was seventh.	We received no formal inquiries from our stakeholders regarding the report. By its nature, aluminum production is energy intensive, creating a significant greenhouse footprint. For more than two decades, we have been actively engaged in efforts to reduce our GHG emissions. (See the Climate Protection section.)

Location	Issue	Action
Anglesea, Australia	Following the closure of our Point Henry smelter in 2014, some members of the Anglesea community called for the Anglesea power station and coal mine to be shut down instead of sold. The station and mine had provided power to the smelter.	<p>Consultation occurred via community meetings, face-to-face meetings with key stakeholders, and newspaper advertorials to keep interested community members informed of progress relative to the sales process. After a sale could not be concluded, we shut down the power station and mine in August 2015.</p> <p>We provided grants totaling US\$168,750 to 14 long-term community partners to help them transition to a future without Alcoa. This was in addition to the US\$3.75 million we contributed in 2014 to the Geelong Region Innovation and Investment Fund to support job creation projects to strengthen and diversify the regional employment base.</p> <p>We continued to engage with the local community in 2016 regarding the final mine closure plan.</p>
Booragoon, Australia	Australian Manufacturing Workers' Union members protested over employee re-rostering and claims we had instructed our suppliers on how to approach contract negotiations for enterprise bargaining agreements.	We refuted the union's claims through formal meetings and written correspondence. We stated that re-rostering had been carried out in accordance with labor agreements, and we do not interfere in negotiations between suppliers and their employees.
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 extended 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. This outcome is now subject to a further legal challenge by the property developers.</p>	<p>In 2015, we held briefings with local and state government representatives, the Kwinana Industrial Council (KIC), and the KIC community consultative committee to call for greater controls to protect the industrial area from development.</p> <p>Via a public statement on our website, we welcomed the state government's proposed legislation to formalize a protection area around the western trade coast industrial area, which includes the Kwinana refinery.</p> <p>We stated the legislation is an important planning tool that will help protect the state's valuable Kwinana industrial assets and avoid future land-use conflicts. We have endorsed the legislation, which will be introduced in 2016.</p>
Kwinana and Pinjarra, Australia	Two separate potential low-level asbestos-exposure incidents involving contractors occurred at the Kwinana and Pinjarra refineries. These resulted in an audit of our asbestos-management procedures by the Department of Mines and Petroleum, which recommended minor modifications to further strengthen our asbestos-management controls.	Our director of health and chief medical officer said in workforce meetings and media statements that the risk of any health impact to the contractors working on the jobs was considered extremely low. This was due to their limited exposure to asbestos-containing material, the type of asbestos, and the short duration of the tasks undertaken.
Pinjarra, Australia	The Australian Manufacturing Workers' Union started a petition calling for WorkSafe to conduct an inquiry into alleged workplace bullying at our Pinjarra refinery. This issue and mental health concerns were also raised in the Western Australian Parliament.	We highlighted to the unions and employees via face-to-face and written communications the avenues available to report workplace bullying and complaints. We also promoted the many initiatives, services, and employment conditions in place to help equip employees and their families to deal with various work and life challenges. In addition, we provided mental health awareness training to all employees.
Portland, Australia	<p>To reduce costs at the Portland Aluminium smelter, we decided to sell our 27-year-old MV Portland vessel and secure a license to use foreign-flag vessels for 12 months.</p> <p>After the MV Portland's final voyage in November 2015, members of the Maritime Union of Australia refused to sail the ship to Singapore to be sold.</p> <p>The Australian Fair Work Commission and the Australian Federal Court ordered the industrial action to stop. Despite this, the MV Portland remained stranded in the Port of Portland at the end of 2015.</p>	<p>To resolve the issue, we met with and wrote to the union and ASP 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>

Location	Issue	Action
Portland, Australia	Due to its electricity intensity, the aluminum smelting industry would be greatly impacted by the Australian federal government's Renewable Energy Target (RET) scheme to a far greater extent than any other Australian industry. Estimates show the RET liability associated with Australian aluminum smelting to be in the range of US\$52.5 million to US\$60 million a year and likely to increase.	After formally engaging relevant stakeholders through face-to-face meetings and written correspondence, we welcomed support from both major political parties to exempt the aluminum smelting industry from RET. This will enable the industry to remain internationally competitive and a significant employer in regional Victoria.
Wagerup, Australia	In June 2012, we were granted approval by the Western Australia minister for environment to allow noise emissions to exceed or vary from the prescribed standard. This approval does not allow increased noise emissions from our Wagerup refinery, but rather brings current noise levels within the regulations.	<p>A noise monitoring program required as part of the approval showed refinery noise emissions during 2014 and 2015 were demonstrably lower than those recorded at the same locations during 2002 and 2003.</p> <p>We were also required to undertake noise monitoring during weather conditions most conducive to noise propagation to measure refinery noise levels compared to the assigned levels. This monitoring found refinery noise was lower than the assigned levels most of the time. Elevated noise levels were recorded on a small number of occurrences in specific areas of the refinery. We are implementing action plans to address the noise at the source.</p> <p>We shared the results of the monitoring program with the Wagerup Community Consultative Network, the Department of Environment Regulation, and interested parties through face-to-face meetings, advertisements in local and state newspapers, and publication on our website.</p>
Western Australian Mining Operations	Exploration drilling near the township of Dwellingup commenced in 2015 following consultation with nearby landholders at the end of 2014. The initial phase of the program resulted in some concern about disturbance of the forest in drilled areas.	<p>We committed to modify our drilling practices, where safe and practical, to reduce the disturbance and visual impact of drilling. We also committed to restoring formal paths and tracks impacted by the movement of drilling equipment. We communicated these measures to landholders in a July 2015 program update letter.</p> <p>We have continued to communicate one-on-one with interested neighbors as needed.</p> <p>The results of the exploration program will be shared with the community in the second half of 2016.</p>
Western Australian Operations	<p>Energy security and access to long-term, competitively priced natural gas is a strategic risk for our refining assets in Western Australia. We are the state's largest user of natural gas, consuming approximately 25% of total domestic supply.</p> <p>Our key Western Australia gas contracts start to roll off toward the end of the decade and expire during 2020. Limited competition and a focus on exporting the state's gas as liquefied natural gas made it difficult to secure new long-term contracts for the volume of gas we need.</p>	<p>Following extensive negotiations, we announced in April 2015 that we had secured a new 12-year gas supply agreement. Commencing in 2020, the agreement is for an initial supply of 120 terajoules per day of natural gas. Combined with a number of smaller agreements, this means we have secured approximately 75% of our Western Australia natural gas requirements to replace the existing long-term contracts.</p>
Itapissuma, Tubarão and Utinga, Brazil	We further restructured our Brazilian extrusion business, which resulted in employee layoffs at these three facilities.	Prior to the official announcement, we met with union representatives at all three plants. For employees, we provided resume-writing assistance, developed a book with candidate references for partner companies, and partnered with local institutions to offer training sessions for skills and jobs with high employability.
Juruti, Poços de Caldas, and São Luís, Brazil	Government officials and community leaders requested a visit to our bauxite residue storage areas following a fatal spill of toxic mud from an iron ore mine owned by Samarco, a Brazilian company owned equally by Vale and BHP Billiton.	<p>We coordinated visits to our Juruti, Poços de Caldas, and São Luís locations for representatives from the cities' legislative assemblies, city councils, community councils, and non-governmental organizations.</p> <p>We educated the groups on our stringent management of bauxite residue and also provided a tour of both active and rehabilitated storage areas.</p>
Juruti, Brazil	The mayor of Juruti requested an update on pending items from the Juruti mine's Positive Agenda, where we committed to voluntarily invest in community initiatives in education, health, security, infrastructure, and social assistance in the Juruti region.	We met several times with members of the prefecture to convey that we are progressing on the remaining six of 54 agenda items and that we aim to complete them in 2016.

Location	Issue	Action
Poços de Caldas and São Luís, Brazil	In June 2015, we permanently closed our Poços de Caldas smelter, which had been curtailed since May 2014. We also curtailed the remaining smelting capacity at our Alumar smelter in São Luís.	In Poços de Caldas, plant leadership met with the city's mayor to convey that the smelter would be closing permanently. For the Alumar curtailment, we engaged with union representatives and the Ministry of Labor to finalize the benefits package for curtailed employees. We also provided career counseling and professional training, retirement and financial advice, and mental health support to curtailed employees and their families.
Baie-Comeau, Canada	Our proposed US\$28 million remediation of the Anse du Moulin bay, which has sediment containing polychlorinated biphenyl and polycyclic aromatic hydrocarbons, received an authorization decree from the Quebec Minister of Sustainable Development, Environment and the Fight Against Climate Change. The approved project should be completed by 2018.	Under Quebec's regulation, the project's environmental impact study went through a regulatory public consultation period that was concluded in 2015 with the decree
Reydarfjörður, Iceland	Local stakeholders expressed concerns about Alcoa's fluoride emissions.	We continued to engage with local communities and government agencies via personal interactions and group meetings regarding fluoride levels emitted from our Alcoa Fjarðaál smelter. Testing in 2015 indicated fluoride in the grass surrounding the facility declined 36% over 2014, reaching levels that are less than half the limit of 40 micrograms per gram of grass.
Portovesme, Italy	We remained available for a possible divestiture of the closed plant while we continued our preparations for full decommissioning.	We continued our interaction with local, regional, and national institutions on decommissioning and remediation permitting matters, as well as possible future opportunities for the site.
Mosjøen, Norway	We are concurrently remediating the Alcoa Mosjøen harbor, which contains sediments with PAH contamination, and extending a wharf shared with the municipality.	We have interacted extensively with various national, regional, and local stakeholder groups and will continue to do so throughout the project. These groups include the Norwegian Environment Agency (NEA), the Norwegian Institute for Water Research (NIVA), municipality leaders (particularly from Vefsn) and authorities. We are combining forces to plan and execute the remediation in the most effective way while using the opportunity to improve the harbor's wharf.
Avilés, La Coruña, and San Ciprián, Spain	We continued to focus on improving the competitiveness of our Spanish smelters, which again participated in the nation's interruptibility auction system in 2015.	Throughout 2015, we again engaged with the relevant national and regional authorities to explore opportunities to achieve a long-term competitive energy framework that is necessary for the viability of our Spanish smelting operations.
Paranam, Suriname	We curtailed the remaining capacity at our refinery in Paranam in November 2015.	We conducted employee and stakeholder information sessions prior to and at the time of the curtailment announcement. We also held multiple negotiation sessions with representatives of both hourly and salaried employees to establish fair and equitable severance packages. A total of 221 of 224 salaried employees accepted the final severance proposals. Alcoa Foundation also provided grants to support entrepreneurial efforts. The union representing the hourly employees filed a court action in December 2015 seeking continued negotiation of the severance package. A hearing in March 2016 resulted in the judge asking the parties to continue to negotiate, and an agreement was reached later that month. We continued discussions with the government of Suriname regarding options to sustain the bauxite industry in the future while acknowledging the need to curtail production at the Paranam refinery.
Newburgh, Indiana, USA (Warrick Operations)	Retired coal miners with the United Mine Workers and some environmental groups, including the Sierra Club, publicly objected to the expansion of our Liberty Mine, located southwest of Boonville, Indiana. The mine supplies our Warrick Power Plant, an 832-megawatt facility that provides electricity to our Warrick Operations.	Along with our contracted mining company, we met with officials and provided statements at public hearings regarding the mining plans. The plans were reviewed and approved in late 2015 by the Indiana Department of Environmental Management and the Indiana Department of Natural Resources.

Location	Issue	Action
Massena, New York, USA	After we announced plans to curtail the Massena West smelter, numerous stakeholders expressed concern about how the curtailment would impact the local economy. We also announced that we were permanently closing the Massena East site, which previously had its potlines closed.	Discussions with various governmental stakeholders resulted in a three-and-a-half year agreement with the state of New York that began in November 2015 and will help keep the Massena West plant operational.
Badin, North Carolina, USA	During a public hearing on the site's storm-water permit renewal, environmental groups expressed concern about contamination and urged the state to require stricter limits and additional remediation.	We engaged with the media to convey that Alcoa is meeting environmental standards and also provide accurate facts regarding the site's discharge amounts and limits. The permit was issued in October 2015.
Badin, North Carolina, USA	Some homeowners who live down river from our Yadkin hydroelectric dams expressed concern about safety and the potential impact on property values. They also wanted a copy of the dams' emergency action plan, which is considered confidential energy infrastructure information by the U.S. Federal Energy Regulatory Commission.	We worked with the Federal Energy Regulatory Commission and local government emergency management agencies to provide relevant information within the commission's requirements. Our hydro operations manager also met personally with the homeowners and offered to show them the emergency action plan at Alcoa's offices.
Cleveland, Ohio, USA	The mayor of nearby Newburgh Heights contacted Alcoa Cleveland to indicate several residents complained about noise from the plant one evening in July 2015.	Alcoa Cleveland unexpectedly had to vent steam that evening for an unplanned repair to its boiler house. Although the resulting sound is comparable to a jet engine, the decibel level did not exceed local government guidelines. The location agreed to inform the mayor of all boiler house maintenance and limit steam venting to between the hours of 8 a.m. and 3 p.m.
Point Comfort, Texas, USA	We partially curtailed refining capacity.	We met with community leaders to provide insight into the market conditions behind the curtailment and reinforce Alcoa's commitment to the community. We re-established the Point Comfort Citizens Panel and Community Advisory Board, both of which had been dormant for several years. We also met frequently with local union leaders to fully coordinate communications and procedures for offering a voluntary quit package to collective bargaining unit members.
Ferndale, Washington, USA (Intalco)	The Northwest Clean Air Agency and the Washington State Department of Ecology conveyed a complaint from a resident who claimed emissions from our Intalco Works had an acute negative impact on the air quality in his home, which is located in a neighboring town.	We reached out to the resident to gather additional information and express our commitment to protecting human health and the environment. Intalco's environmental department staff and consultants investigated the issue and ruled out the possibility of detectable emissions reaching the resident's home. We also supplied the resident with a direct number to call in the event of any future concerns.
Ferndale, Washington, USA (Intalco)	The Puget Soundkeeper Alliance and Friends of the Earth challenged Intalco Works' National Pollutant Discharge Elimination System permit, specifically objecting to the whole effluent toxicity provisions.	Our corporate and location environmental staffs worked closely with Washington State's Department of Ecology on this issue and continued to monitor the impact of regulatory decision making regarding the issue.
Ferndale (Intalco) and Wenatchee, Washington, USA	An aluminum industry tax preference package worth US\$70 million over 10 years was proposed in Washington State's legislature.	Intalco plant management, union leaders and community members testified before state congressional committees on three occasions, asking lawmakers to extend the tax exemptions that had been in place for the previous decade. They also proved that the economic benefits brought by aluminum smelters in the state far outweighed the cost of the tax breaks. The state's governor signed the tax preference into law in 2015. Despite the favorable tax preference package, we made the difficult decision to curtail smelting capacity at Intalco and Wenatchee.
Ferndale (Intalco) and Wenatchee, Washington, USA	We announced the curtailment of all smelting capacity at the Intalco and Wenatchee plants.	After the announcement, management at both locations began working with the unions, state labor organizations, and elected officials to mitigate the impact to employees. A Trade Act application was submitted on behalf of the plants' employees. The plants conducted retirement informational sessions, community resource fairs, and job fairs in the first quarter of 2016. The Wenatchee smelter was idled in December 2015, while Intalco was expected to be idled by the end of June 2016. In May 2016, we announced Intalco would not be curtailed due to an agreement with the Bonneville Power Administration to amend the power contract and workforce training funds from Washington state that will help improve the smelter's competitiveness.

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 environment and education in the communities in which we operate.

The following are some examples of active partnerships during 2015.

American Association of University Women

Alcoa Foundation and the [American Association of University Women](#) (AAUW) have partnered to promote a positive culture for young girls exploring careers in science, technology, engineering, and mathematics (STEM). In Székesfehérvár, Hungary, AAUW organized learning events, and more than 100 middle-school girls had the opportunity to job shadow STEM professionals. AAUW's first Tech Savvy STEM conference in Barberton, Ohio, USA, also engaged more than 100 middle-school girls.

American Forests

Alcoa Foundation and [American Forests](#) celebrated five successful years of their Partnership for Trees program, which enabled the planting of more than 1.1 million trees to reforest damaged ecosystems and create greener spaces around the world. At the end of 2015, 50 unique sites have been restored in nearly 100 projects with the help of thousands of volunteers. These included restoring forests lost to fire in Samarskaya Luka National Park in Russia; replenishing the population of the endangered candelilla tree in Mexico; and repurposing an abandoned railroad line in the U.S. state of Georgia to create the Atlanta BeltLine Arboretum.



Planting trees in Iceland

Institute of International Education

The [Institute of International Education](#) concluded Phase 1 of the Alcoa Foundation Global Internship Program, which

connects underserved youth with meaningful internship opportunities and professional development training. Over the course of the two-year first phase, nearly 450 youth were engaged in 10 Alcoa communities worldwide. Building on this successful partnership, the institute and Alcoa Foundation launched Phase 2 of the program, which will run through 2017.

National Fish and Wildlife Foundation

In the first year of their innovative biodiversity partnership, Alcoa Foundation and the [National Fish and Wildlife Foundation](#) provided support to six conservation projects across the United States. The projects are focused on restoring wildlife habitats, revitalizing waterways, establishing and enhancing native forests, and engaging thousands of volunteers in environmental stewardship projects.

NatureBridge

Alcoa Foundation expanded the partnership it established with [NatureBridge](#) in 2014, sending 54 young adults from 14 countries to Yosemite National Park or Olympic National Park in the United States in 2015. The partnership helps participants gain knowledge and tools on how to be environmental advocates and leaders in their communities.



NatureBridge participants

Purdue University Bike Share Program

An Alcoa Foundation grant to Purdue University created a campus bike-share program. At the end of 2015, 50 aluminum-framed bikes were in place at 13 campus bike-share locations near residence halls, offices, bus stops, parking garages, bike lanes, and parking lots. Launched in August 2015, the program logged more than 14,000 trips and 1 million minutes of usage in the first three months.

Society for Science & the Public

Alcoa Foundation's support of the [Society for Science & the Public](#) enabled more than 2,000 local students to attend the Education Outreach Program at the 2015 Intel International Science and Engineering Fair in Pittsburgh, Pennsylvania,

USA. The students had access to the world's largest international pre-college science fair and a hands-on science lab experience.

Project Consultation

Establishing open and transparent dialogue with individuals and organizations that could be impacted by a proposed new, expanded, or upgraded facility is critical to the success of the project and our ongoing relationship with these stakeholders.

Usually conducted over extended periods of time, project consultation sometimes is not easy. For example, strongly differing views within respective stakeholder groups or circumstances that may require schedule changes or adjustments in local planning require a mutually respectful relationship to work through the issues.

We conduct an environmental and social impact assessment for every proposed project, and this involves extensive stakeholder engagement. The results of these assessments, as well as any ongoing monitoring they may require, are available to the public.

A recent example of our project consultation is the 29,729-square-meter (320,000-square-foot) expansion at our La Porte, Indiana, USA, facility that we opened in October

2015 to produce advanced jet engine parts. As part of the project's stakeholder engagement, we presented at local government meetings, worked with the Greater La Porte Economic Development Council, held one-on-one meetings with elected local and state officials, and engaged with employees and the media on an ongoing basis.

Environmental Improvement Plans

Many of our Australian operations engage with local communities to develop an environmental improvement plan, which is a public commitment to continuously improve environmental performance, reduce environmental impacts, and develop more sustainable practices.

The draft plan undergoes collaborative external review, with adjustments incorporated based upon that review. The final plan, which sets clear targets for improvement, is signed by participating stakeholders. These stakeholders also monitor our progress in achieving the targets and annually review the plan.

Examples of our environmental improvement plans can be found on our [Australian operations website](#).

Related Information

• [Alcoa Foundation](#)

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CASE STUDY

Alcoa Fjarðaál Employees to the Rescue

With little notice and no loss of pay, employees at the Alcoa Fjarðaál smelter in Iceland can leave their workstations to fulfill their duties as volunteers with the Icelandic Association for Search and Rescue (ICE-SAR). Their efforts have saved lives and provided financial support to the non-governmental organization for almost a decade.

Iceland is surrounded by water and has extreme weather conditions and frequent natural disasters, including avalanches, earthquakes, and volcanic eruptions. Because there is no navy or army and a coast guard with few ships and helicopters, volunteer-based organizations like ICE-SAR have taken on the responsibility for rescues and accident-prevention training in the community.

In 2015, 31 employees at our smelter volunteered 4,456 hours with local ICE-SAR squads. Their efforts resulted in the organization receiving US\$15,500 in Alcoa BRAVO! employee volunteer grants. Our employees also participated in two projects under the Alcoans Coming Together in Our Neighborhoods employee engagement program in 2015, earning ICE-SAR another US\$5,000. Alcoa and Alcoa Foundation have provided additional financial support to the squads since the smelter opened in 2008, including a US\$100,000 foundation grant in 2010.

"Search and rescue teams from all around the east coast have benefitted from Alcoa's support," said Eidur Ragnarsson, former president of the Reydarfjörður Rescue Squad. "The grants have enabled us to buy new equipment and focus more of our volunteer hours on training and education instead of fundraising. Last but not least, Alcoa Fjarðaál's policy of allowing its employees to attend callouts and training during their working hours has helped our members dedicate themselves to our teams and remove the stress of losing income when helping others in need."



Alcoa rescue squad volunteers gave rides to coworkers' children on Alcoa Fjarðaál family day.

Making an Economic Impact

- In September 2015, we announced a plan to separate our upstream and value-add businesses into two companies.
- Our value-add businesses generated 60% of our revenues and 53% of segment profits in 2015.
- In 2015, we paid US\$5.4 billion in labor costs and spent US\$18.2 billion for goods and services globally.

We understand the importance of the economic value we create for our shareholders, customers, employees, and the communities in which we operate.

Disciplined financial management is essential to ensure long-term success for Alcoa and our stakeholders. We maintain robust financial controls, a strong dedication to financial returns, and an intense focus on creating value through

top-line growth, strategic capital spending, and cost-reduction activities.

In September 2015, we announced a plan to separate our upstream and value-add businesses into two companies. The separation is expected to occur in the second half of 2016. (Read the [press release](#).)

2015 Financial Performance

Objective	Key Results/Actions
Reposition the Portfolio	<ul style="list-style-type: none"> ● Our Global Rolled Products, Engineered Products and Solutions, and Transportation and Construction Solutions business groups, which are our value-add businesses, generated 60% of our revenues and 53% of segment profits. ● We acquired RTI International Metals, a global supplier of titanium and specialty metal products and services for the commercial aerospace, defense, energy, and medical device end markets. This business, which was integrated into Engineered Products and Solutions, is expected to contribute revenues of approximately US\$1.2 billion by 2019. We also acquired TITAL, an aerospace structural castings company that generates annual revenue of approximately US\$100 million. ● In mid-2015, we reorganized our Engineered Products and Solutions business group by creating a new business group named Transportation and Construction Solutions. The reorganized Engineered Products and Solutions business group primarily serves the aerospace end market and includes the recent acquisitions of Firth Rixson, RTI International Metals, and TITAL. The newly-created Transportation and Construction Solutions business group principally serves the nonresidential building and construction and commercial transportation end markets. ● Value-add products represented 67% of total primary aluminum shipments from Global Primary Products, our upstream business that consists of mining, refining, smelting, casting, and energy. These cast aluminum products, which include billet, slab, and rod, are customized to meet the specific needs of our customers. ● We announced the closure or curtailment of 812,000 metric tons, or 23%, of our year-end 2014 global smelting capacity and 3,530,000 metric tons, or 20%, of our year-end 2014 global refining capacity to lower our position on the global aluminum and alumina cost curves and improve our competitiveness. At the end of 2015, we had completed these actions for 313,000 metric tons of smelting capacity and 1,705,000 metric tons of refining capacity.
Profitable Growth	<ul style="list-style-type: none"> ● Engineered Products and Solutions generated revenue of US\$5.3 billion and productivity gains of US\$299 million. This business segment's adjusted earnings before interest, taxes, depreciation, and amortization (EBITDA) margin was in the 20% to 25% range for the sixth consecutive year. ● Transportation and Construction Solutions generated productivity gains of US\$112 million and revenue of US\$1.9 billion. The EBITDA margin of this business segment matched its historical high (achieved in 2014) in 2015. ● Global Rolled Products generated US\$6.2 billion in revenue and US\$205 million in productivity gains. This business segment's adjusted EBITDA per metric ton was slightly below its three-year (2010-2012) average historical high. ● Global Primary Products generated US\$532 million in productivity gains that, along with closing or curtailing high-cost capacity, improved its position on the global alumina cost curve to the 23rd percentile (from 25th) and maintained its position on the global aluminum cost curve at the 43rd percentile.

Objective	Key Results/Actions
Disciplined Execution	<p>As a company, we achieved the following:</p> <ul style="list-style-type: none"> • Productivity gains of US\$1.2 billion; • A stable level of average days working capital (below 30 days) from 2014 (excluding the impacts of acquisitions), despite supporting our organic growth initiatives related to the automotive and aerospace end markets; • A debt-to-EBITDA ratio of 2.80; and • Cash from operations of US\$1.6 billion, and capital expenditures of US\$1.2 billion.

All productivity figures represent gross productivity and are presented before tax and before non-controlling interests' share. Alcoa's definition of adjusted EBITDA is net margin plus an add-back for depreciation, depletion, and amortization. Net margin is equivalent to sales minus the following items: cost of goods sold; selling, general administrative, and other expenses; research and development expenses; and provision for depreciation, depletion, and amortization.

Complete details on our 2015 financial performance can be found in the [Alcoa Annual Report](#).

Contributions to Communities

We operate in many communities throughout the world. Our contributions to those communities, and to society at large, are significant and bring social and economic benefit to regions wherever we operate.

The contributions we make annually include:

- Compensation that we pay and benefits that we provide to employees;
- Payments for services and supplies to tens of thousands of contractors and suppliers that support our local operations;
- Dividends to our shareholders;
- Payments for income taxes to national, state, and local governments; and
- Significant charitable contributions we make both financially through our business operations and Alcoa Foundation and in-kind from employee volunteers.

We consider it an honor and a privilege to be able to operate in the various local communities where we exist around the world. As a neighbor, we have an obligation to contribute positively to those communities each and every day. That accountability is what earns us the license to continue to operate there.

In addition to the contributions highlighted, we paid US\$223 million combined in dividends to our common and preferred shareholders and US\$487 million in interest (net of interest capitalized) under our financing arrangements in 2015.

We understand that business decisions we make have an impact in the communities where we operate, including when we curtail or close operations. For each, we conduct extensive stakeholder engagement.

In 2015, communities were impacted by the announced curtailment or closure of our facilities in Anglesea, Australia; São Luís and Poços de Caldas, Brazil; Paranám (Suralco), Suriname; Ferndale (Intalco) and Wenatchee, Washington, USA; Point Comfort, Texas, USA; and Evansville (Warrick), Indiana, USA.

2015 Value Added by Region

U.S. dollars

	Asia	Australia	Europe	North America	South America	Total
Sales (billions)	0.8	2.2	5.9	12.7	0.9	22.5
Labor Costs (billions)	0.1	0.5	0.9	3.7	0.2	5.4
Procurement Spend (billions)	0.6	1.9	4.5	9.7	1.5	18.2
Income Taxes (millions)	20.1	173.6	61.5	59.9	30.3	345.4
Alcoa/Alcoa Foundation Community Investments (millions)	0.4	2.5	5.2	24.5	4.3	36.9

Sales are based upon the country where the point of sale occurred. Labor costs include compensation and benefits for employee services rendered plus employee expenses for external training, transfer and relocation, expatriate costs, workers' compensation, travel, recognition and rewards, medical expenses, meals, recruitment, transportation, education, work clothes, and other employee-related expenses. Income tax amounts are net of income tax refunds received and exclude various other taxes, such as sales taxes, excise duties, levies, and local taxes not based on income. A more detailed breakout of 2015 community investments can be found on the Alcoa Foundation site.

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Reducing Our Footprint

Efficient use of resources and effective control of emissions, waste, and land use drive improved environmental performance.

BANDICOOT

Building on Two Decades of Leadership

- Our Global Primary Products business group reduced its total greenhouse gas intensity by 31.3% between 2005 and 2015, achieving the global target five years ahead of plan.
- We were named to the Standard and Poor's 500 Climate Disclosure Leadership Index.
- We were one of the first companies to sign the American Business Act on Climate Pledge.

As a leader in climate protection, we are focused on reducing greenhouse gas emissions from our production processes while also manufacturing products that help our customers reduce their carbon footprint.

In 2015, we continued our transformation into a global manufacturer of innovative, multi-material products and solutions that improve energy efficiency, reduce greenhouse gas emissions, and enhance our natural environment. We also completed an ambitious initiative that determined the positive greenhouse gas impact, or handprint, of almost all of our products and created a repeatable methodology to track it. (See the Net Positive and Products sections for additional information.)

Greenhouse gas emissions are inherent in the aluminum-making process, but emissions avoided by using and recycling aluminum and aluminum-based alloys are substantial relative to the emissions generated in the manufacturing phase. This is due to the material's light weight, infinite recyclability, and other emissions-reducing benefits.

Approximately 90% of our total greenhouse gas emissions in 2015 came from our Global Primary Products business group, which is our upstream business that consists of mining, refining, smelting, casting, and energy. Smelting is the biggest emitter of greenhouse gases throughout all of Alcoa due to its high energy use. In our value-add business groups—Global Rolled Products, Engineered Products and Solutions, and Transportation and Construction Solutions—rolling mills and casthouses emit the most greenhouse gases, although the amount is a small percentage of our overall emissions.

We have attained past ambitious greenhouse gas reduction targets by using hydroelectricity, developing and sharing emissions best practices, and increasing energy efficiency. Our current target is a 30% reduction in Global Primary Products' carbon dioxide equivalent intensity by 2020 and 35% by 2030 from a 2005 baseline. Carbon dioxide represents most of our greenhouse gas emissions.

In 2015, we achieved a 31.3% intensity reduction from the baseline, exceeding our 2020 target five years ahead of plan. Compared to 2014, our intensity declined 7.3%.

Our total 2015 carbon dioxide equivalent emissions equaled 34.9 million metric tons, of which 24.1 million metric tons were direct emissions. This is a 13.7% reduction in total emissions from 2014.

Transformation of our upstream business continued to be a major factor behind these achievements, as we saw a reduction in smelting operating capacity through the closure, idling, and divestiture of facilities over the past few years. One of the biggest impacts came from the 2014 closure of the Point Henry smelter in Australia, which used coal as its energy source.

Global Primary Products Greenhouse Gas Emission Intensity

Metric tons of carbon dioxide equivalents per metric ton of production

	Refining	Smelting (IPCC, 4th TAR)	Total (IPCC, 4th TAR)
2005 Baseline	0.63	9.22	10.42
2011	0.57	6.94	8.03
2012	0.57	6.88	7.97
2013	0.57	6.67	7.76
2014	0.56	6.66	7.72
2015	0.54	6.13	7.16
Reduction from Baseline	14.3%	33.5%	31.3%
2020 Goal			7.29 (30%)
2030 Goal			6.77 (35%)

Goal: 30% reduction Progress: As of Dec. 2015 **↓31.3%**

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 metal production (refining is included at a ratio of 1.9 metric tons of alumina to 1.0 metric tons of smelted metal). These two processes and their associated power supply represent approximately 90% 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.

Greenhouse Gas Emissions

Million metric tons of carbon dioxide equivalents

	Direct (Scope 1)	Indirect (Scope 2)	Total
2011	30.6	16.6	47.3
2012	29.8	16.7	46.5
2013	28.2	15.1	43.4
2014	26.9	13.5	40.4
2015	24.2	10.7	34.9

See the Assurance section for third-party assurance information. Of our 34.9 million metric tons of carbon dioxide equivalent in total emissions in 2015, 33.5 million metric tons were associated with carbon dioxide, 0.076 million metric tons were associated with methane, 0.052 million metric tons were associated with nitrous oxide, 0.007 million tons were associated with SF₆, and 1.26 million metric tons were associated with perfluorocarbon (CF₄ & C₂F₆) emissions from aluminum smelting. There were no significant hydrofluorocarbon emissions. The estimated 2015 biogenic CO_{2e} emissions from the combustion of biodiesel were 3,553 metric tons. These emissions are not included in the total 2015 CO_{2e} emissions. Estimated indirect carbon dioxide equivalent emissions are those occurring at our purchased electricity and steam supplier facilities.

In 2015, we were named to the Standard and Poor's 500 Climate Disclosure Leadership Index for transparency in reporting and the high quality of our carbon emissions and energy data.

Scope 3 Emissions

Our Scope 3 (supply chain) emissions in 2015 were 5.6 million metric tons of carbon dioxide equivalents. Most of these emissions were associated with the purchase of raw materials, fuels, and transportation.

In 2015, we again engaged [First Environment](#) to provide limited assurance on our Scope 3 emissions for six of the 15 categories—purchased goods and materials (3.0 million metric tons), fuels and energy purchased (2.4 million metric tons), waste generated in operations (5,579 metric tons), business travel (12,182 metric tons), employee commuting (84,814 metric tons), and transportation and distribution—downstream (119,944 metric tons).

Climate Change Strategy

There are five main elements to our climate change strategy—emissions reduction, strategic energy decisions, stakeholder and policy engagement, product advantage, and climate adaptation.

Emissions Reduction

Our emissions-reduction efforts focus on process improvements, transformational technology, and energy sources and efficiency, primarily in our upstream business.

In 2015, our smelters around the world met our 3 Million Ton Challenge, which sought to reduce perfluorocarbon emissions through process changes, management best practices, and portfolio changes that impacted some of our highest perfluorocarbon-emitting operations. By mass,

perfluorocarbons are the second most significant type of greenhouse gases emitted by our operations.

In 2015, our smelters reduced emissions of perfluorocarbons by 3.0 million metric tons from the challenge's 2005 baseline and 0.38 million metric tons over 2014.

While our value-add businesses do not emit significant greenhouse emissions, we still work to minimize their impact in this area. For example, we placed all of the U.S. manufacturing locations in our Global Rolled Products, Engineered Products and Solutions, and Transportation and Construction Solutions business groups in the [Better Buildings Better Plants](#) program run by the U.S. Department of Energy.

By striving to achieve our pledge to reduce the combined energy intensity of these locations by 25% by 2020 from a 2005 baseline, we also will be reducing their direct and indirect greenhouse gas emissions.

In 2015, we initiated a pilot project to install electric vehicle charging stations at certain locations and increase awareness of electric vehicles among our employees. To gauge employee interest, we hosted three drive and ride events in conjunction with Nissan at our locations in Hannover, Germany, and at Alcoa Technical Center and Alcoa Corporate Center in Pennsylvania. We installed a charging station at our Hannover location in December 2015, and we plan to install stations at the Alcoa Technical Center, Alcoa Corporate Center, and other potential facilities in 2016. We continue to evaluate installing charging stations at other locations around the world.

Our 2015 variable compensation program again included an annual target based on carbon dioxide emission reductions gained from process improvements and improved energy efficiency. Under this program, we improved energy intensity and achieved a corresponding reduction of 250,000 metric tons of carbon dioxide equivalents during the year. A notable achievement was a 10% increase in energy efficiency by our Davenport, Iowa, USA, facility in 2015 compared to 2014.

Strategic Energy Decisions

To minimize our direct and indirect greenhouse gas emissions, we are committed to reducing the carbon intensity of the energy we generate and purchase.

A number of our facilities have switched their fuel sources, resulting in significant reductions in greenhouse gas emissions. For example, our refinery in San Ciprián, Spain, reduced its carbon dioxide equivalent emissions by 135,000 metric tons in 2015, which was the first full year of operation since shifting its energy mix from fuel oil to natural gas.

The opportunity to purchase power from natural, renewable energy sources remains limited in many regions in which we operate. Despite this challenge, more than 74% of the

purchased electricity used by our smelters in 2015 came from renewable sources.

Stakeholder and Policy Engagement

We continue to engage with governments, non-governmental organizations, nonprofits, civic groups, industry associations, and other relevant stakeholders around the world on the issue of climate change. We work to ensure the significant use-phase benefits of aluminum are included in policy discussions, and we also gain deeper insight into stakeholder concerns.

In 2015, we were one of the first U.S. companies to sign the [American Business Act on Climate Pledge](#) to demonstrate our support for action on climate change and the conclusion of a climate change agreement in Paris that takes a strong step forward toward a low-carbon, sustainable future. Our chief sustainability officer also participated in two White House panels on cross-sector efforts to reduce greenhouse gas emissions.



White House panel

As part of our pledge, we committed to:

- Reduce our absolute U.S. greenhouse gas emissions by 50% versus a 2005 baseline by 2025;
- Deploy our full range of innovations to develop materials, products, and technologies that move us toward a low-carbon sustainable future; and
- Demonstrate a net reduction of greenhouse gas emissions from the use of our products equal to three times the emissions created by their production by 2025.

At the United Nation's COP21 climate change conference in Paris in 2015, our chief sustainability officer participated in a panel discussion on the American Business Act on Climate and an energy-efficiency best-practice sharing event organized by the U.S. Department of Energy.

Product Advantage

We continue to help policymakers and customers understand the role that aluminum and aluminum-, titanium-, and

nickel-based alloys, as well as multi-material solutions, can play in the mitigation of global warming. Life cycle assessments show that the light weight, strength, conductivity, and recyclability of aluminum and other light-metal-based products can create a clear advantage in reducing or avoiding greenhouse gas emissions compared to other materials. (See the Net Positive and Products sections for additional information.)

Climate Adaptation

The potential physical impacts of climate change on our operations are highly uncertain and will be particular to geographic circumstances. Our 2014 analysis of climate risk and changing weather patterns helped us determine how these potential impacts may adversely affect the cost, production, and financial performance of our operations over the next several decades.

Climate factors are likely to have an impact on our global mining operations, access to energy (hydropower in particular) and freshwater, supply chain efficiencies, and the transportation of raw materials. Changing weather patterns also could impact our products and growth projections, global demand for aluminum and other light metals, sites for new operating locations, availability of skilled workers, and retrofits to existing operations (including bauxite residue management areas).

To minimize the potential impact of changing climatic conditions, we have included additional considerations into the minimum design criteria for any new facilities we construct. These criteria require broader analysis of future conditions that might necessitate the need for relocation and/or protection against climate-related impacts. For existing facilities, we incorporate the same process for any significant plant upgrades, and we review appropriate countermeasures during updates of our emergency preparedness plans.

We also continue to develop innovative and resilient products that help customers in key markets, such as building and construction, prepare for climate change. See the Products section for examples and additional information.

Related Information

- [Alcoa's 2016 CDP Climate Change Response](#)
- Energy section ([page 59](#))
- Net Positive section ([page 17](#))
- [Make an Impact \(U.S.\)](#)

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Securing a Sustainable Energy Future

- Our Global Primary Products business group reduced its energy intensity by 4.2% compared to the 2005 baseline.
- Compared to its 2005 baseline, our Global Rolled Products business group had an 18.5% reduction in energy intensity.
- Our Engineered Products and Solutions and Transportation and Construction Solutions business groups achieved a 23.0% decline in their combined energy intensity against the 2010 baseline.

Energy is a critical resource for our global operations. We strive to reduce the amount of energy we consume while increasing our use of renewable energy sources.

Globally, we control more than 2.1 gigawatts of generating capacity to provide for the energy needs of our smelting and refining system and regional wholesale markets. We supplement this with purchased electricity, of which more than 68% is from renewable sources. In addition, more than 74% of the purchased electricity used by our smelters globally is from a renewable source.

Global Primary Products, our upstream business group, is the largest user of energy within our global operations due primarily to the energy-intensive nature of refining alumina and smelting aluminum. Rolling mills and casthouses in our value-add business groups—Global Rolled Products, Engineered Products and Solutions, and Transportation and Construction Solutions—are the highest users of energy for that segment of our company.

We have set the following long-term strategic targets to reduce energy use in our four business groups:

- From a 2005 baseline, a 10% reduction in the energy intensity of Global Primary Products by 2020; 15% by 2030.
- A 20% reduction in the energy intensity of Global Rolled Products from its 2005 baseline by 2020; 30% by 2030.
- From a 2010 baseline, a 20% reduction in the combined energy intensity of Engineered Products and Solutions and Transportation and Construction Solutions by 2020; 30% by 2030.

Global Rolled Products again made progress against its energy-intensity goals in 2015 through energy-efficiency improvements, achieving a 3.8% reduction compared to 2014 and 18.5% since 2005. Global Primary Products maintained its energy intensity from 2014 while achieving a 4.2% reduction since 2005. Engineered Products and Solutions and Transportation and Construction Solutions increased

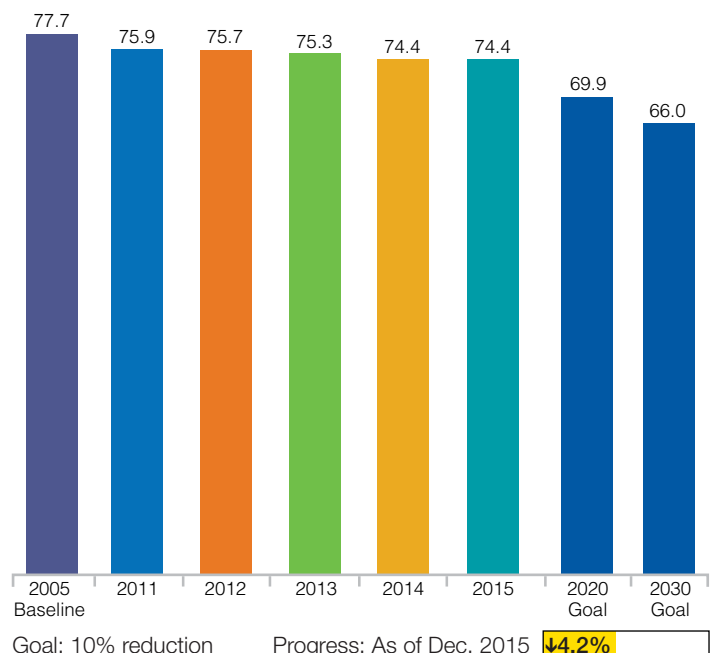
their combined energy intensity by 2.2% year over year due to new and modified facility startups and extreme winter temperatures. However, the business groups reduced their combined intensity by 23.0% compared to the 2010 baseline.

In 2015, we reduced our overall energy consumption by 49.7 million gigajoules, or 10.1%, compared to 2014.

For the first time, we received third-party verification of our energy data. (View the limited assurance report from First Energy in the appendix.)

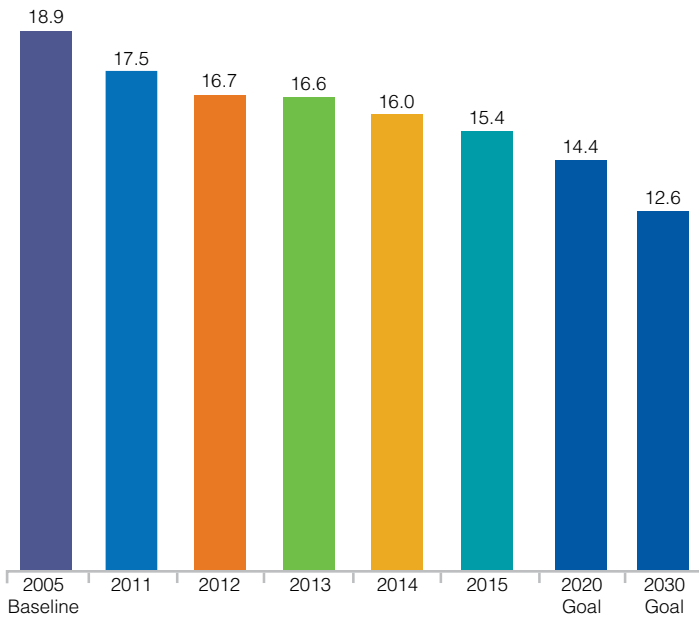
Energy Intensity—Global Primary Products

Gigajoules per metric ton of aluminum produced



Energy Intensity—Global Rolled Products

Gigajoules per metric ton of production

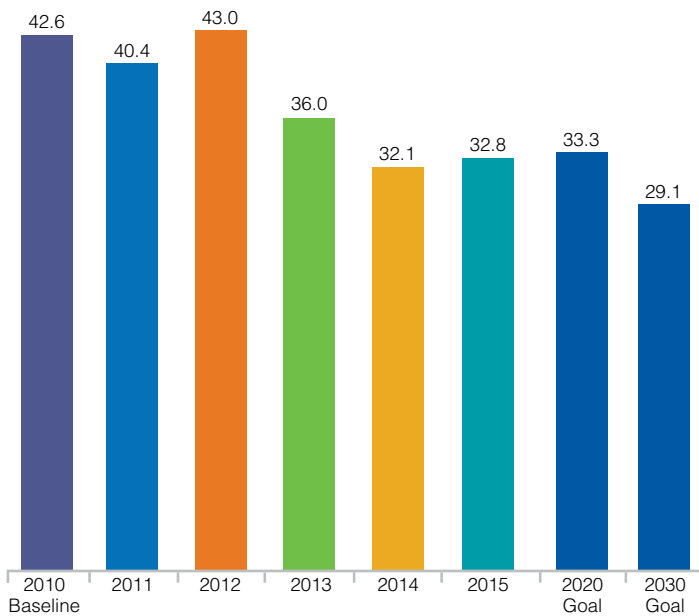


Data changes from prior year are due to updated data reporting and portfolio changes.

Goal: 20% reduction Progress: As of Dec. 2015 **↓18.5%**

Energy Intensity—Engineered Products and Solutions and Transportation and Construction Solutions

Gigajoules per metric ton of production



Data changes from prior year are due to updated data reporting and portfolio changes.

Goal: 20% reduction Progress: As of Dec. 2015 **↓23.0%**

2015 Total Energy Consumption

Energy	Gigajoules	Megawatt Hours
Direct Energy—Global Primary Products	229,039,656	
Direct Energy—Global Rolled Products, Engineered Products and Solutions, and Transportation and Construction Solutions	30,899,021	
Purchased Electricity—Global Primary Products	171,367,433	47,602,064
Purchased Electricity—Global Rolled Products, Engineered Products and Solutions, and Transportation and Construction Solutions	11,796,275	3,276,743
Total	443,102,385	

2015 Direct Energy Consumption by Source—All Business Groups

Source	Gigajoules	Percent
Natural Gas	153,546,065	59
Coal	84,024,899	32
Oil	18,557,011	7
Diesel	3,129,242	1
Steam	464,953	< 1
Propane	110,355	< 1
Distillates	106,152	< 1
Total	259,938,677	100

2015 Purchased Electricity by Source—Global Primary Products

Source	Megawatt Hours	Percent
Hydro	30,496,565	64
Coal	6,628,792	14
Natural Gas	5,637,872	12
Other Renewables	3,134,751	7
Nuclear	1,579,607	3
Oil	64,650	< 1
Local Grid	59,827	< 1
Total	47,602,064	100

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

For energy consumption, as well as greenhouse gas emissions, we use the [World Resources Institute](#) and [World Business Council on Sustainable Development](#) Greenhouse Gas Protocol to establish boundaries and account for mergers, acquisitions, divestitures, startups, and shutdowns of operating facilities. We report energy consumption based on management control as defined in the Greenhouse Gas Protocol. The [Intergovernmental Panel on Climate Change Guidelines](#) and the U.S. Environmental Protection Agency databases (such as the [Emissions &](#)

[Generation Resource Integrated Database](#) for the source of data on the characteristics of electric power generation) are used as the source of heat content values for fuel sources.

Energy Efficiency

We continued reducing the energy intensity of our manufacturing operations as a challenge partner in the [Better Buildings Better Plants](#) program run by the U.S. Department of Energy. We placed all of the U.S. manufacturing locations in our Global Rolled Products, Engineered Products and Solutions, and Transportation and Construction Solutions business groups in the program and pledged to reduce their combined energy intensity by 25% by 2020 from a 2005 baseline, which is more aggressive than our global goal of a 20% reduction. Although the energy intensity for these plants increased 1.3% in 2015 due, in part, to the ramping up of facility expansions, the sites have achieved an 11% reduction since the 2005 baseline.

In January 2015, we hosted an in-plant training and assessment session with the U.S. Department of Energy at our Rancho Cucamonga, California, USA, location. We closely evaluated the location's process heat and compressed air during the session, resulting in multiple opportunities to improve energy efficiency.

Globally, [Alcoa Energy](#) connects our businesses and locations to share best practices and capture savings. In 2015, the group conducted an energy savings opportunity scheme at 12 locations in the United Kingdom to comply with U.K. and European energy directive mandates. The audits identified approximately US\$2 million in energy-saving opportunities.

Energy kaizens, assessments, technical assistance, and other activities at our various locations globally realized approximately US\$2.6 million in energy-saving opportunities in 2015.

We continued as an industrial partner in the [ENERGY STAR](#) program in 2015. As a partner, we are working to measure, track, and benchmark our energy performance; develop and implement a plan to improve energy performance; adopt the ENERGY STAR strategy; and educate our staff and the public about our partnership and achievements with ENERGY STAR. In addition, our Building and Construction Systems business took the [ENERGY STAR Challenge for Industry](#) at six locations beginning in 2015.

Renewable Energy

Our operations around the world use a variety of renewable energy sources, with hydroelectricity being the primary form. We believe that the environmental and social impacts of well-designed hydroelectric systems can be minimal if the

projects are properly planned and constructed.

We are a partner in four operating hydroelectric power plants in Brazil—Barra Grande, Estreito, Machadinho, and Serra do Facão. The Pai Querê plant, in which we are also a partner, is in the licensing stage.

We have established a social agreement with stakeholders and government authorities to promote the sustainable development of the 12 municipalities located near the Estreito plant, which became fully operational in 2013. Along with our partners and Brazil's National Bank for Economic and Social Development, we have developed a fund to invest in social projects for these municipalities. Through the end of 2015, approximately US\$40 million was invested in 116 social projects in five major areas: social development, education, health, sanitation, and economic development. The partners invested US\$25.5 million directly, with the remaining US\$14.5 million coming from private investment that was leveraged through a public partnership.

Our Canadian smelters in Deschambault, Baie-Comeau, and Bécancour are supplied almost entirely (more than 97%) with renewable energy. These smelters are "Distinction" members of Hydro-Québec's Energy Savers' Circle, which is the highest recognition in energy efficiency awarded by that company.

In Iceland, almost 100% of the purchased energy used by our Alcoa Fjardaál smelter is hydroelectricity. Our Mosjøen and Lista smelters in Norway also use approximately 98% hydroelectricity.

Related Information

- [Alcoa Energy](#)

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Conserving a Valuable Resource

- Our freshwater-use intensity declined by 13.2% in 2015 versus 2005 levels.
- Our operations used 96.3 million cubic meters of water in 2015, which is a 2.5% decline from prior year.

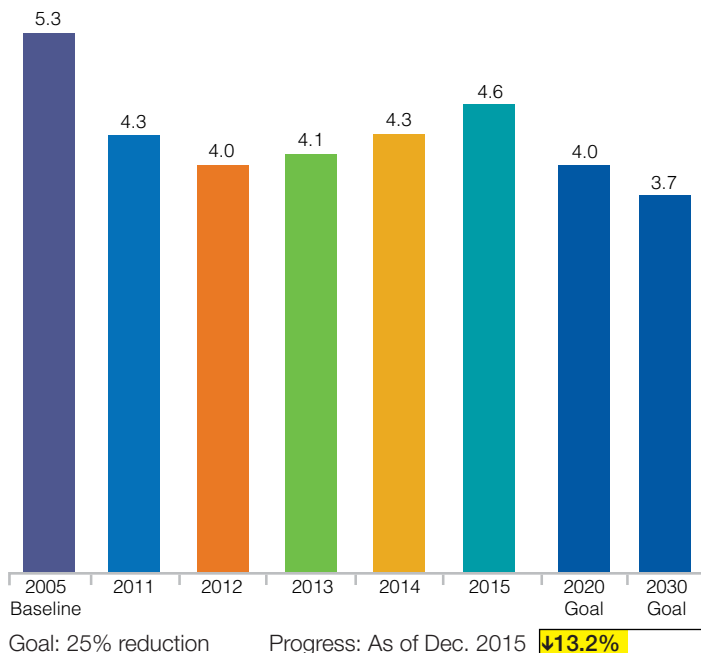
Our facilities throughout the world rely on a sustainable supply of water, and we are committed to conserving this valuable resource through strategic water management and innovative technology.

Our upstream locations, particularly those involved with alumina refining and aluminum smelting, are our largest users of water. While our midstream and downstream businesses—known as our value-add businesses—require significantly less water, some have operations located in water-stressed areas.

Our global goal is a 25% reduction in average freshwater-use intensity by 2020 and 30% by 2030 from a 2005 baseline. In

Freshwater-use Intensity

Cubic meters of water per metric ton of production



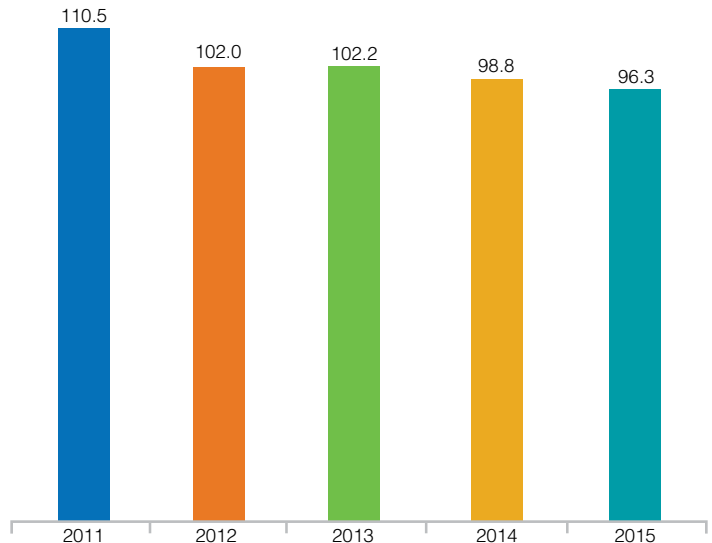
The 2014 data change from prior year was due to updated data reporting. Large volume, once-through water usage from our energy facilities is excluded from the intensity metric, which reflects only freshwater used to directly manufacture products. Because of the variability in the basis for measuring production in our businesses, these values represent a metric calculated by taking each business intensity measurement indexed proportionally to production. Smelting production is indexed to metric tons of aluminum produced. Refining production is converted to metric tons of aluminum produced. Fabrication production is indexed to metric tons of product rolled.

2015, our intensity was 13.2% lower than the baseline and 7.0% higher than 2014.

While our total freshwater use declined 2.5% from prior year, the increase in freshwater-use intensity was due to the closure and sale of less water-intensive facilities and changes in product mix that negatively impacted our intensity.

Total Freshwater Use

Millions of cubic meters



Rainwater not included.

Total Freshwater Use by Region

Millions of cubic meters

	Asia	Australia	Europe	North America	South America	Total
2011	0.7	25.4	27.5	45.4	11.5	110.5
2012	0.6	21.3	26.5	42.5	11.1	102.0
2013	0.4	23.2	26.8	42.2	9.6	102.2
2014	0.5	24.9	29.2	36.8	7.4	98.8
2015	0.6	20.0	27.3	38.7	9.7	96.3

Rainwater not included.

2015 Freshwater Withdrawal by Source

Source	Millions of Cubic Meters
Surface Water	54.0
Groundwater	27.9
Rainwater	37.6
Wastewater	1.0
Municipal Water	13.4

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

Strategic Water Management

Our first step in using water efficiently and effectively is ensuring we have qualified people to manage this resource and state-of-the-art equipment and processes that minimize both water use and wastewater discharge. We then continuously evaluate our water use to identify opportunities to reduce consumption and increase reuse.

In late 2015, for example, we conducted a three-day kaizen (continuous improvement) event at our Mosjøen smelter in Norway, which is one of our largest users of water. Although the local water supply is low-cost and plentiful, the location was interested in evaluating its processes and current water usage to identify cost-effective reduction opportunities, such as using portable flow meters and updating water-balance diagrams. The kaizen team will continue to evaluate the feasibility of the various identified options in 2016.

In some regions of the world where we operate, water is limited due to droughts and other factors. These water-sensitive

regions can vary each year, which requires us to adapt our water approach accordingly. Areas of specific concern are California and Texas (United States) and Western Australia. The latter region is prone to droughts, and we have worked to identify secondary sources of water and reduce the evaporation of stored water at our refineries.

Periodically, we conduct 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](#) (WBCSD) and the [World Resources Institute](#) to verify potential areas of stress. Our most recent survey was initiated in early 2016.

A 2014 analysis of climate risk and changing weather patterns enabled us to identify, among other things, how changing weather patterns could impact the water profile of our operations. In 2015, we added scarcity of water to our global risk inventory. We describe scarcity of water as the inability to decrease freshwater consumption or find a competitively priced water supply alternative at impacted operations.

When appropriate, we collaborate with other businesses and stakeholders to fully understand all water-related opportunities and risks. For example, we participated in WBCSD's efforts on sharing best practices and technology and charting a worldwide sustainable water course. At the location level, we have engaged with our stakeholders to ensure we are appropriately addressing all potential water-conflict situations.

CASE STUDY

Environmental, Safety Benefits Flow from Stormwater Management Project

A project to address stormwater runoff issues at our Lafayette, Indiana, USA, location had an added benefit—a safer and more aesthetically pleasing site.

Runoff from the facility's parking lot routinely exceeded the capacity of the onsite treatment system during large rain events, leading to permit violations and community concerns. To rectify the situation, Lafayette constructed rain gardens and five retention ponds to store the runoff and have it dissipate naturally. This solution can capture enough water to account for a 60-year, 24-hour rain event, preventing thousands of gallons of runoff from overwhelming the stormwater treatment system each year.

The design incorporated a roundabout to minimize vehicle interactions and raised pedestrian walkways to reduce the potential for employees to walk in vehicle pathways. The pervious material used along the walkways allows water to pass through to the soil beneath.

Site beautification includes native grasses, shrubs, and trees to assist in absorbing runoff and reducing heat generated by exposed asphalt.

Since construction, the facility has had zero non-compliance events for stormwater runoff.



Retention pond

Whenever we upgrade an existing facility, we assess the potential for water reduction and reuse. For new plants, we determine the long-term availability of water resources and what restrictions exist or will be imposed on wastewater discharges.

Technology

We develop, evaluate, and deploy innovative technologies and approaches to both reduce the water used in our operations and increase recycling opportunities.



Residue filtration

A good example of a technology with multiple benefits is residue filtration, which came online 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 is expected to reduce freshwater use by 1.2 gigaliters (317 million gallons) annually and significantly reduce the active residue storage space. We are evaluating the use of this technology at other refineries around the world.

At our Waco, Texas, USA, location, metal finishing processes typically required a large volume of water. In early 2015, the location implemented a new coating process that decreased water usage by more than 45% from the 2010 baseline. The process also reduced or eliminated hazardous chemicals in the wastewater that previously were treated and landfilled.

Modifying our production processes to eliminate specific contaminants in our wastewater, which reduces the amount of energy and chemicals required to treat this water before it is discharged, remains an area of focus.

We continue to expand the use of the Alcoa-developed Natural Engineered Wastewater Treatment (NEWT™) system to treat sanitary and process wastewater, which is then reused in our manufacturing processes. In March 2016, we began operating a NEWT system at our facility in Wichita Falls, Texas, USA, a region that has been experiencing severe drought. The system is expected to treat and recycle 73,815 cubic meters (19.5 million) gallons of wastewater annually.

NEWT systems are already operational at the Alcoa Technical Center in the United States and the Ma'aden-Alcoa joint venture in Saudi Arabia.

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CASE STUDY

NEWT™ System Helps Texas Facility Overcome Drought Challenges

Facing strict water usage limits due to a severe drought, our Wichita Falls, Texas, USA, facility implemented a comprehensive water-management solution that included installation of the Alcoa-developed Natural Engineered Wastewater Treatment (NEWT) system to facilitate water reuse.

The management plan targeted an overall water-use reduction between 20% and 30% to meet the new restrictions and also ensure the facility's continued ability to operate at full capacity. With US\$2.4 million in funding secured through a partnership with the Wichita Falls Economic Development Corporation, the plant installed the NEWT system to naturally treat sanitary wastewater, as well as a reverse osmosis system for industrial wastewater purification.

The combined systems, which became operational in March 2016, have the capacity to treat and recycle 73,815 cubic

meters (19.5 million) gallons of wastewater annually. The location expects to reduce its overall water usage by 68%, significantly above the original goal.



NEWT system at Wichita Falls

Minimizing Waste, Reducing Emissions

- Our landfilled waste declined by 13.9% between 2005 and 2015.
- We improved our bauxite residue storage efficiency by 20.9% between 2005 and 2015.
- We recycled or reused 57% of our spent pot lining in 2015.

Innovation and commitment are behind the significant progress we have made in lessening our impact on the environment.

We closely manage the emissions and waste 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, especially with bauxite residue, but we are committed to developing and pursuing technologies and processes that continue to shrink our footprint.

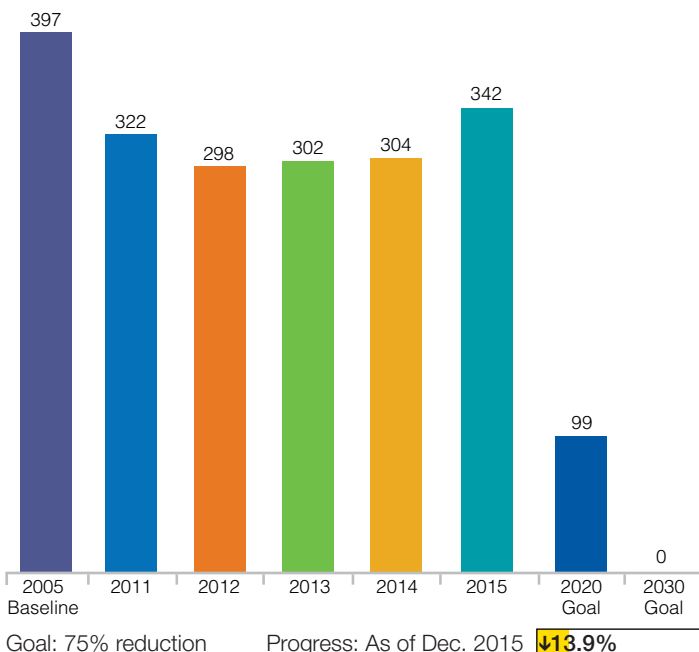
Landfilled Waste

Minimizing the waste we produce and finding uses for that which we do generate will help us achieve our strategic target of a 75% reduction in landfilled waste by 2020 and 100% 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. We have separate programs to

Landfilled Waste

Thousands of metric tons

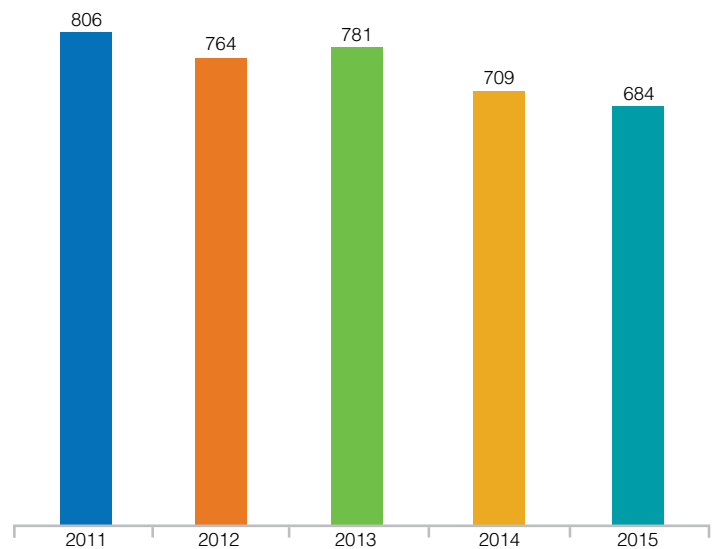


minimize and reuse these high-volume wastes. In addition, overburden and rock generated from our mining activities are not included since both materials are reused in mine rehabilitation and are not considered waste.

In 2015, we saw an increase in landfilled waste primarily due to production curtailments. Since 2005, we have achieved a 13.9% reduction.

Total Wastes Sold or Recycled

Thousands of metric tons



Many of our locations continued their efforts to reduce landfilled waste in 2015.

At our Waco, Texas, USA, location, for example, metal finishing processes typically required a large volume of water and hazardous chemicals. This led to many metric tons of hazardous waste being treated and landfilled. In 2015, the location began using a new coating process that eliminated the use of hexavalent chrome and reduced sulfuric acid use by 90%. As a result, 231 metric tons of hazardous waste to landfill was avoided, which is almost 50% less per pound of production compared to the 2010 baseline. Water usage also decreased by 49% per pound of production from the baseline.

A focused effort to recycle process waste at our Howmet Japan location in Nomi resulted in a 78% reduction in

landfilled waste between 2012 and 2015. The site recycled 88% of its process waste—primarily ceramic slurry, used molds, wax, and sludge—in 2015.

During 2015, our Kawneer business introduced a new anodize process in its North American locations that removes only a fraction of the aluminum typically removed during conventional caustic-only etching. We anticipate the process will deliver a 50% to 70% reduction in anodize sludge, which previously represented 94% of the locations' total landfilled waste.

Bauxite Residue

Bauxite residue is generated during the alumina refining process and is composed 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 2015, we generated 22.8 million metric tons of this residue.



Bauxite residue storage area in Western Australia

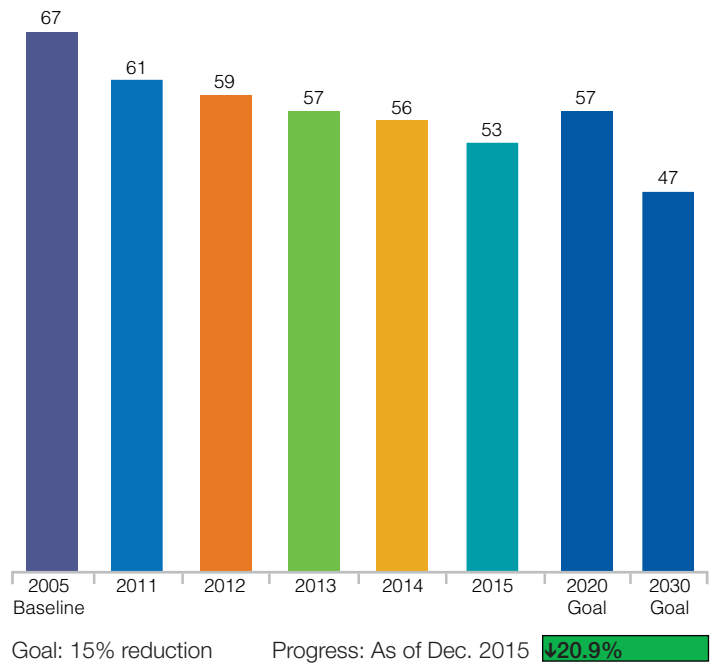
We have three long-term strategic targets for bauxite residue that are focused on reducing the overall footprint associated with our management of the material. These goals are:

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

We continued improving our bauxite residue storage efficiency in 2015 after meeting our 2020 goal seven years ahead of schedule in 2013. We also saw positive movement in our rehabilitation rate, but challenges remain in meeting our residue reuse goal.

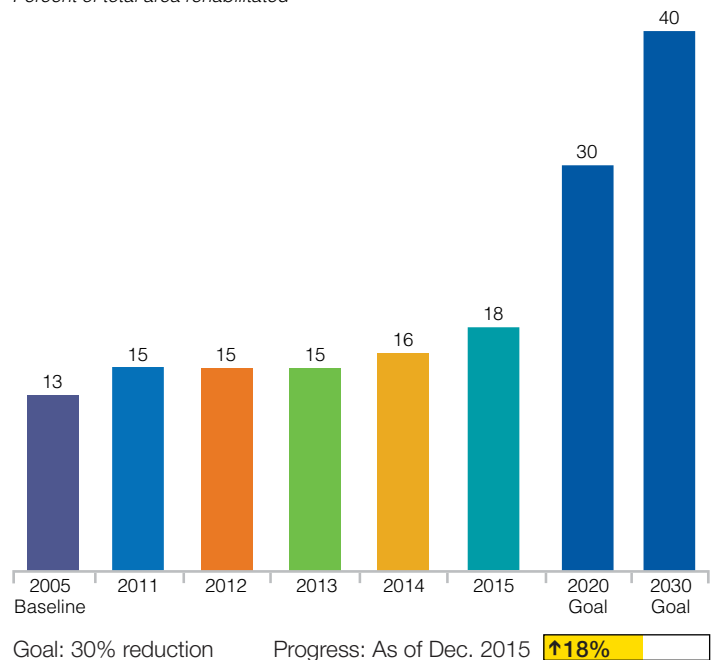
Bauxite Residue Storage Efficiency

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



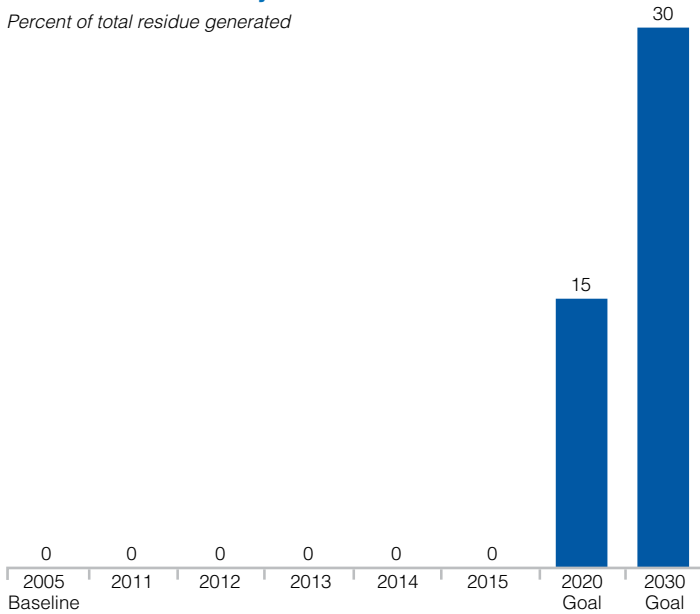
Bauxite Residue Storage Area Rehabilitation Rate

Percent of total area rehabilitated



Bauxite Residue Recycled or Reused

Percent of total residue generated

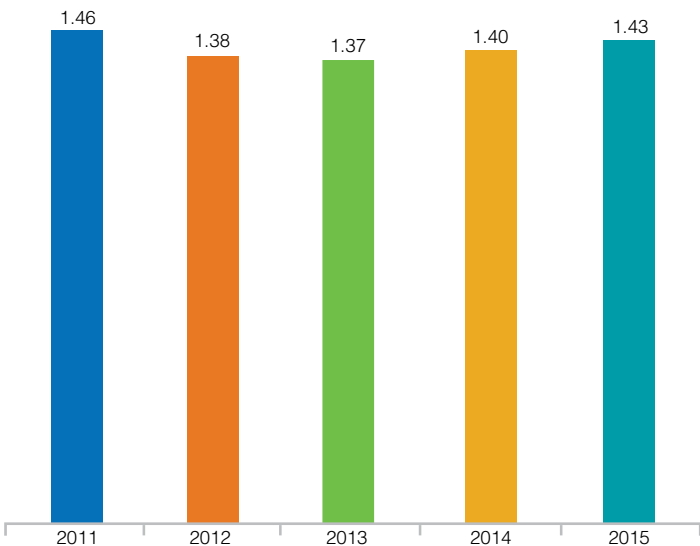


Due to the high volume of residue produced each year, the percent recycled or reused is minimal.

Goal: 15% recycled Progress: As of Dec. 2015

Bauxite Residue Intensity

Metric tons per metric ton of alumina produced



One focus area of our ongoing bauxite residue research is improving residue storage practices to reduce potential environmental impacts. For example, we control wind-blown dust via water-spray systems. In the 1980s, we transitioned from wet storage ponds to an innovative dry stacking process in Western Australia that subsequently became an industry best practice. This process minimizes the amount of land required for storage, reduces the risk of groundwater contamination, increases the speed of rehabilitation, and reduces safety hazards to people and animals.

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

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 is also expected to reduce freshwater use by 1.2 gigaliters (317 million gallons) annually. We are evaluating the use of this technology at other refineries around the world.



Residue filtration

We are also working to improve how we close residue storage areas once they are full. While imported fill can be used to cap the areas, we are investigating transforming the residue into a viable soil layer that can sustain a vegetative cover and initiate a more natural remediation.

We have globally mandated standards involving the construction, management, and maintenance of our residue storage areas. An independent third-party professional also conducts an annual geo-technical inspection 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.

Our efforts to reuse bauxite residue have been slower than we would like despite advancements we have made 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 our innovative NEWT system. (See the Water section for additional information).

Spent Pot Lining

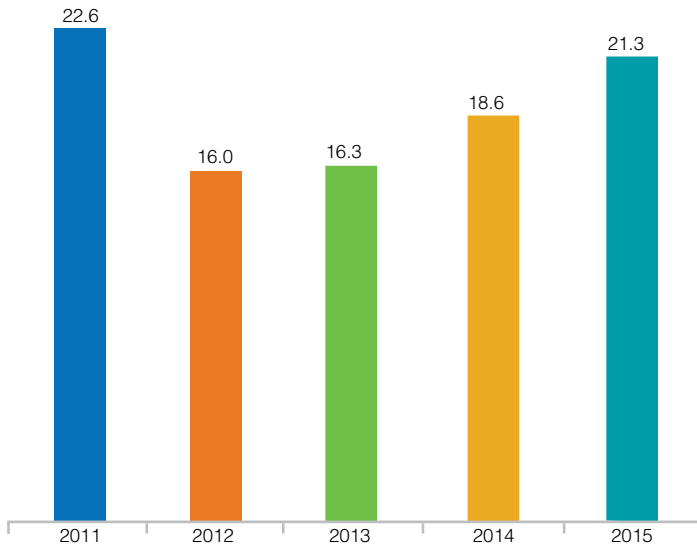
Spent pot lining is the carbon and refractory lining of smelting pots that have reached the end of their serviceable life.

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 the spent pot lining that we generate into a raw material or fuel source for other industries. For example, the cement industry

Spent Pot Lining Intensity

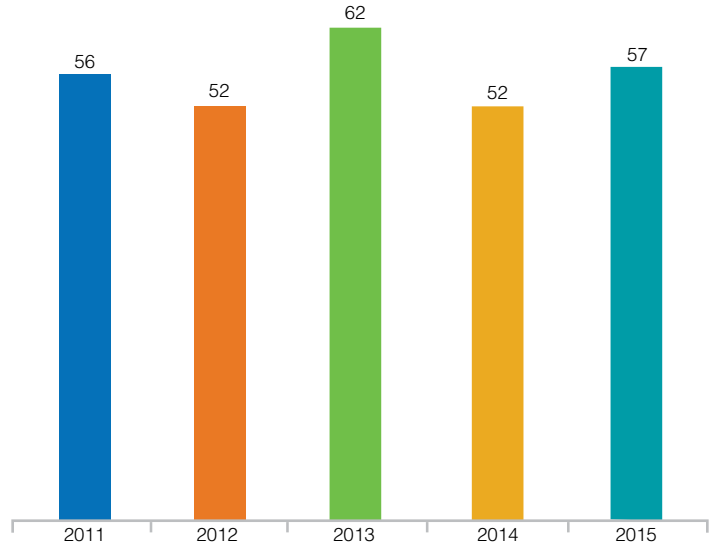
Kilograms per metric ton of aluminum produced



Intensity rates do not include demolition tonnage from permanently idled smelters. The increase in 2015 was due to less production as a result of smelter curtailments.

Spent Pot Lining Recycled/Reused

Percent



Decreased recycling in 2012 and 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.

CASE STUDY

Coolant Substitution Rolls Up Savings, Emissions Reductions

By replacing a coolant used in its hot reversing mills, our Davenport Works in Iowa, USA, is saving US\$1.6 million annually in material and energy costs and emitting significantly less volatile organic compounds and particulate matter.

A hot reversing mill's rollers need to be sprayed continuously with coolant to prevent the metal passing through them from sticking and getting surface imperfections. The old coolant had to be heated to 150° Fahrenheit to prevent bacteria from growing, and it also left behind a dirty residue that impacted emissions. In addition, the heated coolant produced significant steam in the area where it was stored, creating an unsafe place to work for a large part of the year.

Davenport extensively evaluated a substitute coolant to ensure it met the plant's own quality and production requirements and also those of customers, who would use the metal to fabricate finished products.

The new, cleaner coolant does not have to be heated, reducing energy consumption and eliminating safety risks from decreased visibility due to steam. The plant also has seen a 62% decline in volatile organic compound emissions and 56% drop in particulate emissions.



Coolant spray on the hot reversing mill

uses spent pot lining as fuel and a raw material. It is also a raw material used in the production of steel and a fuel source in the manufacture of rock wool insulation.

We recycled 57% of the spent pot lining we produced in 2015, which is a 9.6% increase compared to 2014 due to growth in recycling opportunities.

Air Emissions

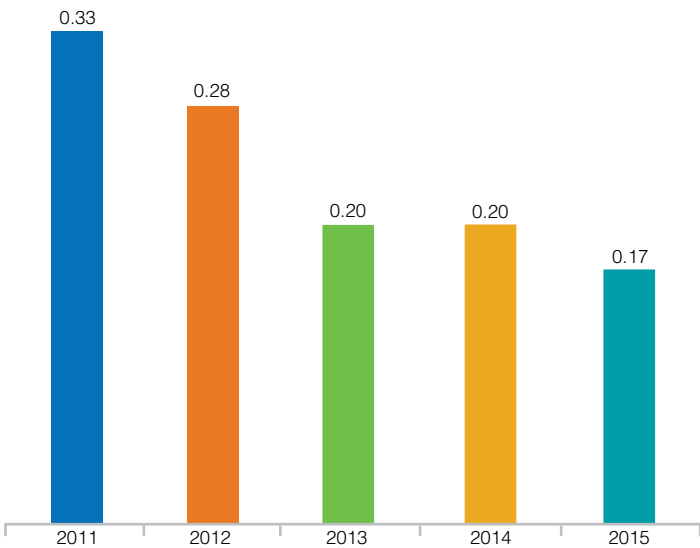
Our locations produce different types of air emissions depending upon the manufacturing process. The bulk of our greenhouse gas and fluoride emissions come from our smelting operations, while our refineries account for most of our mercury emissions. (See the Climate Protection section for a discussion on greenhouse gases.) We continue to work at a global level to reduce these and all emissions to industry benchmark levels.

At the Alcoa Fjarðaál smelter in Iceland, for example, fluoride in the grass surrounding the facility declined 36% between 2014 and 2015, reaching levels that are less than half the reference limit of 40 micrograms per gram of grass. The smelter began implementing operational changes in 2012 when levels climbed above the reference limit. Alcoa Fjarðaál has some of the lowest fluoride emissions among the world's smelters.

Other emissions that we track globally, but which often are significant to specific operations or regions, include nitrogen oxide, sulfur dioxide, and volatile organic compounds. All three posted declines in 2015, primarily through the closure or idling of facilities.

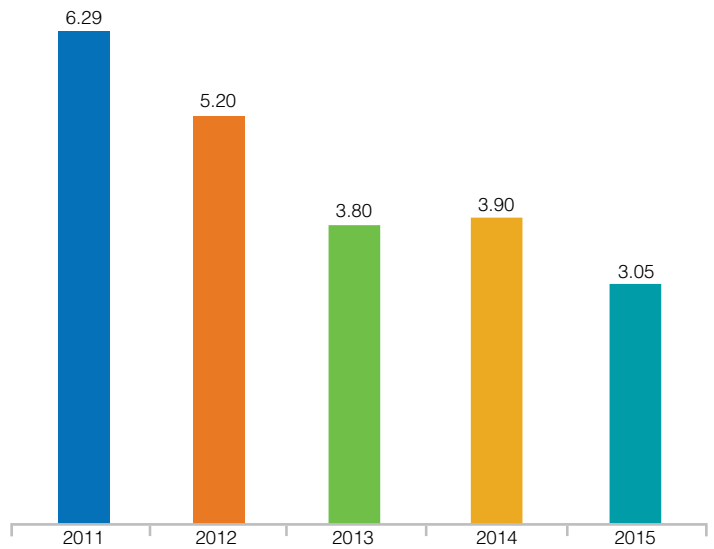
Mercury Emissions Intensity

Grams per metric ton of alumina produced



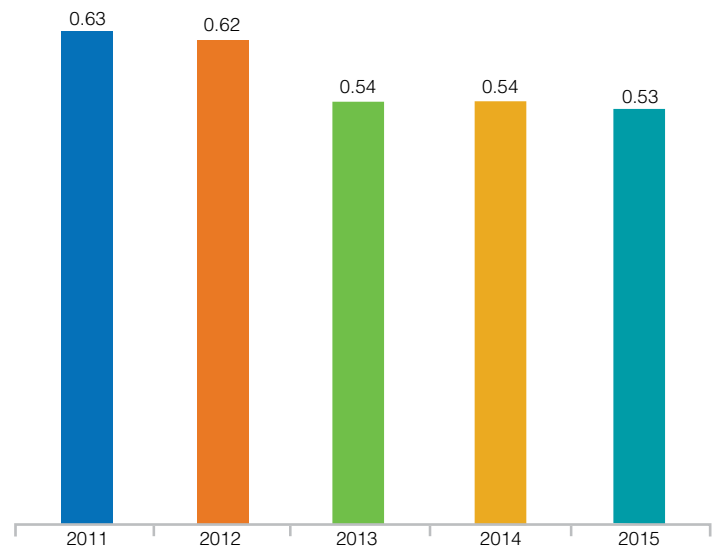
Mercury Emissions

Thousands of kilograms



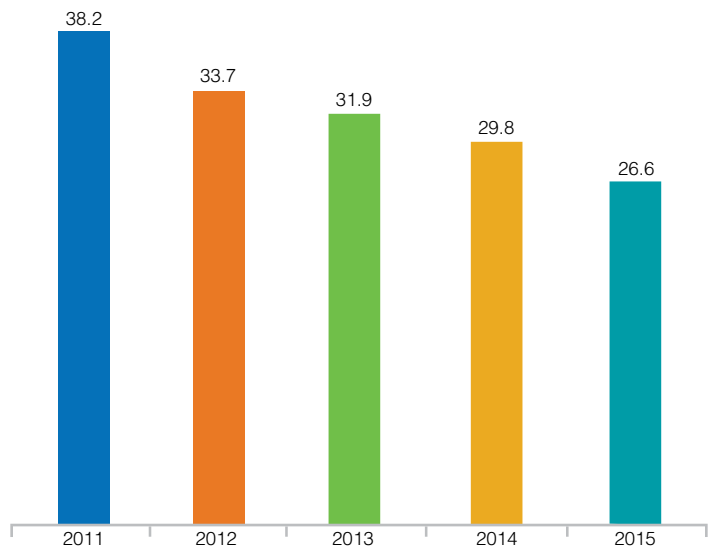
Fluoride Emissions Intensity

Kilograms per metric ton of aluminum produced



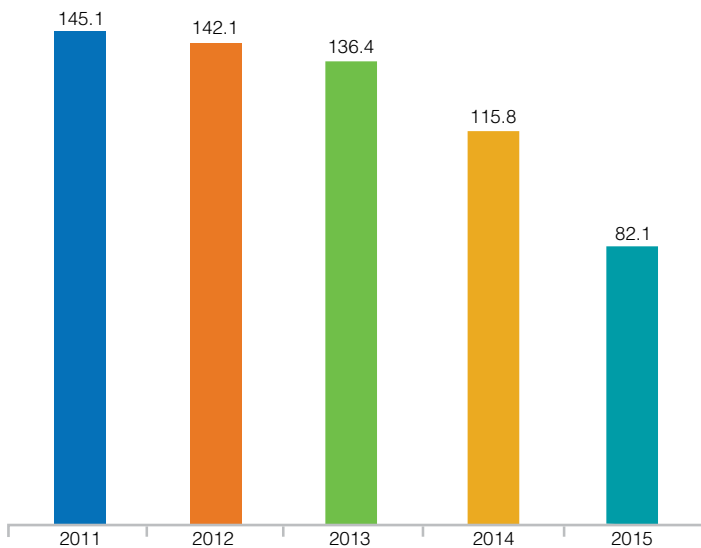
Nitrogen Oxide Emissions

Thousands of metric tons



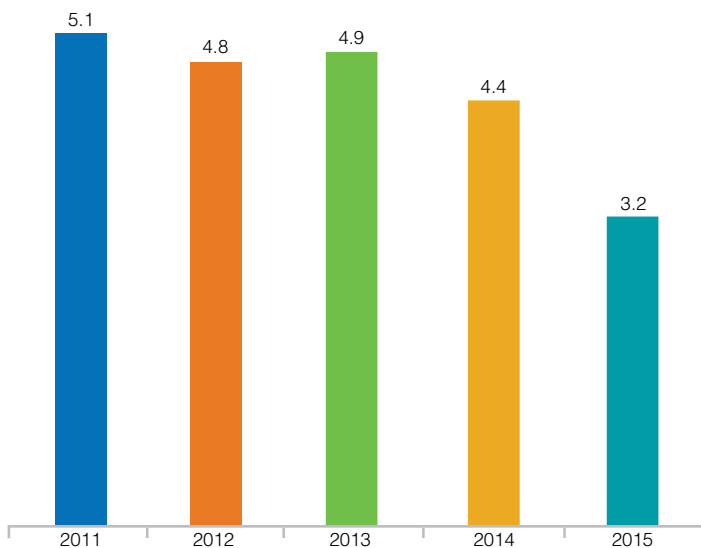
Sulfur Dioxide Emissions

Thousands of metric tons



Volatile Organic Compounds Emissions

Thousands of metric tons



Ozone-depleting Substances

We use halon gas as a fire suppressant in several locations throughout the world, and we are phasing out the few 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.

In 2015, 79% of our operating locations operated without any environmental non-compliance incidents compared to 69% in 2014.

Environmental Incident Rate

	Spills Over 20 Liters	Major Spills	Environmental Incident Rate per Location
2011	560	4	7.3
2012	562	9	10.1
2013	497	4	9.1
2014	578	1	8.0
2015	560	2	4.6

We require any spill of oils or other process liquids in excess of 20 liters to be reported internally as an incident—whether or not they are contained within our facilities, and whether or not 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. The environmental incident rate is the total number of reported incidents (spills and other reported environmental incidents) divided by the total number of 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.

2015 Major Spills

Material Spilled	Volume Liters	Environmental Impact
Hydraulic oil	1,100	Moderate impact to drainage ditch; remediation required.
Caustic liquid	Unknown	200 river fish killed.

These spills were characterized as major environmental incidents according to our Environmental Incident Management System. They were not reported in our financial statements as significant spills, as they did not result in significant financial impact.

Environmental Capital Expenditures

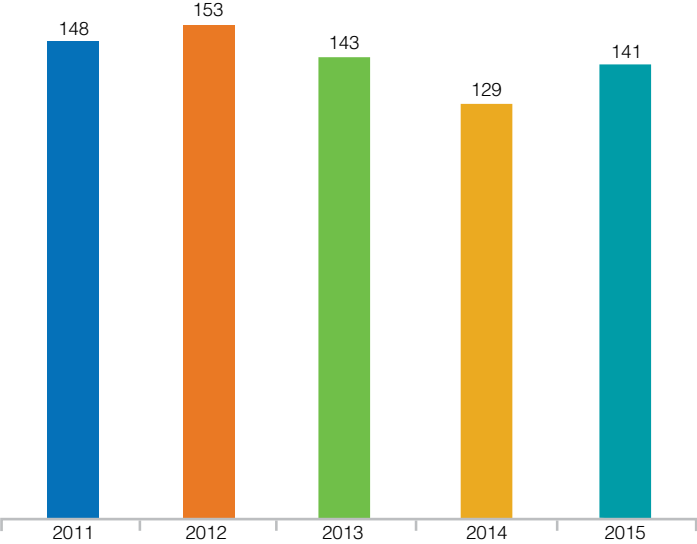
Our capital expenditures for environmental purposes vary each year based on the number and type of projects implemented. In 2015, we invested US\$141 million in capital projects primarily focused on improving environmental control systems.

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 to be carried out incorporates best practices and the completed project minimizes additional impact on our environmental footprint.

Environmental Capital Expenditures

Millions of U.S. dollars



[Back to index](#)

Land Management

Serving as Stewards of the Land

- We are developing biodiversity management plans at key locations.
- To lessen the impact of our mining, we have set minimum environmental footprints for each mine to achieve by 2020.

BIODIVERSITY

MATERIAL ISSUE

We actively endorse biodiversity conservation by operating in a manner that minimizes our effects on natural habitats and biological resources.

Our approach is to avoid sensitive land areas where possible, minimize the disturbance of the original habitat, and work closely with community and regulatory stakeholders to restore those lands we do impact to the most productive use

possible, including re-establishing pre-operating conditions when feasible.

We have committed to not explore, mine, or operate in **World Heritage sites**. We also avoid designated protected areas where strict nature conservation is the management objective. We do endorse the concept of multiple land use where possible, having successfully operated bauxite mines, alumina refineries, and aluminum smelters in sensitive native ecosystems.

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)	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)

Biodiversity impacts from our operations vary, and we implement industry-leading processes and techniques to mitigate disruption to plants, 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.

One of our challenges is measuring our biodiversity management performance since it is difficult to find a metric that can be aggregated across our diverse businesses. We have an aspirational goal to provide a net positive impact on biodiversity everywhere we operate, but as yet we have been unable to develop a common, quantifiable global goal that measures such impact.

We had a measurable strategic sustainability target that called for all locations with substantive biodiversity values and land holdings to develop a biodiversity action plan by the end of 2015 that:

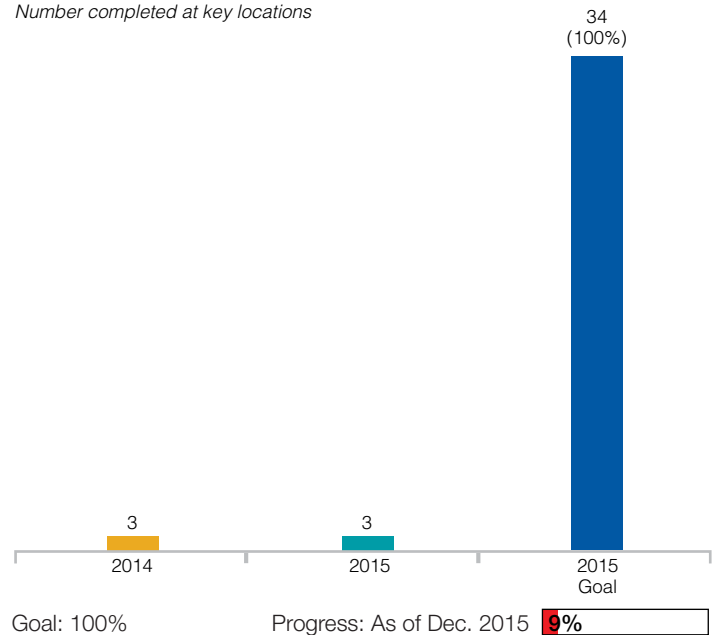
- Identifies the biodiversity values of the land, including sensitive habitats and the presence of threatened species and communities, in context with surrounding land;
- Pinpoints potential impacts, both positive and negative;
- Develops a management plan based on the hierarchy of biodiversity mitigation measures—avoid > minimize > rectify > compensate;

- 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 asked 34 locations representing approximately 17% of our locations worldwide to develop a biodiversity action plan. Three locations (our mining operations in Western

Biodiversity Action Plan Implementation

Number completed at key locations



CASE STUDY

Biodiversity Action Plan Leads to First Protected Area in Juruti

While creating a biodiversity action plan for its own land, our Juruti mine in the Brazilian Amazon encouraged and supported the city of Juruti to develop a second plan to protect the municipality's environmental resources. A major outcome was the creation of the region's first protected area in 2015.

The mine and city are located in a biodiversity hotspot that had no conservation strategy. Illegal logging, hunting, and fishing posed substantial risk to the land's sustainability.

With technical support from the mine's staff and a US\$300,000 grant from Alcoa Foundation, the city and Conservation International assessed the area's biotic, socioeconomic and physical environments; conducted 12 community workshops on biodiversity; explored creating an environmentally protected area; and developed a fundraising plan to access resources for conservation.

These efforts resulted in the city's first biodiversity action plan and the creation of the 653-hectare (1,614-acre) Mole Lake Wildlife Refuge. The first protected area in Juruti, Mole Lake

is a fish nursery that populates other lakes in the region and contributes to the livelihood of the local population. The lake also houses important nesting grounds for several species of migratory and resident birds and is a habitat for endangered species.



Mole Lake

Australia, the Portland Aluminium smelter in Australia, and the Juruti mine in Brazil) have developed plans that will serve as models for the other locations to follow from 2016 onward.

Limited internal resources delayed the finalization of these three plans until 2015. That pushed back development of the other 31 plans, which caused us not to meet our 2015 goal.

In 2015—the first year of an innovative biodiversity partnership—Alcoa Foundation and the National Fish and Wildlife Foundation provided support to six conservation projects across the United States. The projects are focused on restoring wildlife habitats, revitalizing waterways, establishing and enhancing native forests, and engaging thousands of volunteers in environmental stewardship projects.

The foundation and American Forests also celebrated five years of their Partnership for Trees program, which enabled the planting of more than 1.1 million trees to reforest damaged ecosystems and create greener spaces around the world. At the end of 2015, 50 unique sites have been restored in nearly 100 projects with the help of thousands of volunteers. These included restoring forests lost to fire in Samarskaya Luka National Park in Russia; replenishing the population of the endangered candelilla tree in Mexico; and repurposing an abandoned railroad line in the U.S. state of Georgia to create the Atlanta BeltLine Arboretum.

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, effects the project would have on the environment.

This thorough analysis documents the level of ecosystem and species diversity within their area of influence using techniques, procedures, and information generally accepted by the international scientific community as a leading practice. 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 climate regulation, erosion control, and disease control. A company can both benefit from ecosystem services as well as impact them, and these may be seen as either risks or opportunities to the company.

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.

Protecting biodiversity and the essential ecosystem services linked to it are key environmental objectives.

MINE REHABILITATION

At Alcoa, we believe that mining is only 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 of the land. In many cases, we strive to return the land to its original state, such as forests, swamps, and grasslands. If the government or local community wishes, our rehabilitation supports other productive land uses, such as farming and residential, commercial, or industrial developments.



Rehabilitated area at Willowdale mine in Australia

To lessen the impact of our mining, we have set aggressive minimum environmental footprints for each mine to achieve by 2020. 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, all mines are rehabilitating any excess land disturbed for mining. Each also has developed a strategic management plan for long-term infrastructure, committing to repurpose the buildings, haul roads, and railroads for future use. Areas that cannot be repurposed will be rehabilitated.

Both the minimum footprint and long-term infrastructure plans are reviewed annually and adjusted as appropriate to reflect operational and other considerations.

In 2015, we had five active bauxite mining areas and three active coal mines. A number of inactive mines also contributed to the year's total open area to varying degrees. We sold our stake in the Jamaica bauxite mine in late 2014 and ceased mining in Suriname in late 2015 following the full curtailment of our refinery in that country. The Anglesea coal mine in Australia ceased operations at the end of August 2015.

Three of our mines that were active in 2015 have achieved their minimum environmental footprint. Another two are projected to meet their target by 2020, and we are working with the remainder to ensure they are on a path for success.

We did require substantial increases in minimum footprint targets at our Juruti mine in Brazil due to increased production and at our Huntly mine in Western Australia because of delays in rehabilitation. These delays were a result of our strategy to eradicate potential infection of haul roads by the naturally occurring soil pathogen *Phytophthora cinnamomi*.

Mining Land Disturbed/Land Rehabilitated

Hectares

	Open Mine Area	Area Disturbed	Area Rehabilitated
	Cumulative as of Year-end	Annual	Annual
2011	14,960	1,484	1,027
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

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.

We do not include data from the CBG mine in Africa, in which we are a minority partner, because CBG management has not yet accepted our rehabilitation target and minimum environmental footprint philosophy.

The open mine area in each succeeding year should be the open area from the preceding year plus any area disturbed and minus any area rehabilitated. Because the open areas are independently reviewed and corrected from time to time, this calculation may not work in all cases.

Area Disturbed for Mining and Associated Infrastructure

Hectares

	Asia	Australia	Europe/ Africa	North America	South America	Total
	2011	0	1,169	0	84	231
2012	0	680	0	94	330	1,104
2013	0	890	0	268	279	1,437
2014	0	818	0	179	417	1,414
2015	0	756	0	109	330	1,195

Annual figures. Area disturbed means annual land used in each reported year for mining or for mining infrastructure (e.g., roads, shops, crushing equipment, conveyors). The increase in disturbed area in North America in 2013 was due to the opening of the Liberty mine (195 hectares/482 acres of disturbance) and ongoing mining at the Friendsville mine (73 hectares/180 acres of disturbance).

Open Mine Area

Hectares

	Asia	Australia	Europe/ Africa	North America	South America	Total
	2011	0	4,592	0	1,094	9,274
2012	0	4,468	0	1,091	9,256	14,815
2013	0	4,562	0	1,248	9,301	15,111
2014	0	4,804	0	1,261	9,567	15,632
2015	0	5,009	0	1,191	8,693	14,893

Cumulative figures. Open mine area is the cumulative area of land that has not been rehabilitated (including active mines and land used for mining infrastructure).

North American data for all years include a total of 219 hectares (541 acres) of land at the inactive Squaw Creek (USA) coal mine, 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 are still pending final bond release, which we expect will be completed between 2017 and 2019. In Australia, construction of a new crusher site (Myara) for the Huntly mine while the current crusher site, McCoy, was still fully operational added significantly to the open area in 2011 and 2012. The 2015 open mine area at Huntly remained elevated, even though the McCoy crusher site ceased operation that year. This is because the rehabilitation of the final mined areas and linking haul roads is being delayed as part of 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. Early results suggest eradication will take approximately two years, at which time the backlog of open area will be rehabilitated.

Area Rehabilitated

Hectares

	Asia	Australia	Europe/ Africa	North America	South America	Total
	2011	0	686	0	79	262
2012	0	804	0	97	296	1,197
2013	0	796	0	111	233	1,140
2014	0	576	0	166	266	1,008
2015	0	550	0	179	564	1,293

Annual figures. 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.

During 2010 and 2011, internal agreements with Suralco mine operations were reached that released approximately 200 hectares (490 acres) of land for rehabilitation each year in the Marowijne District (Coermotibo mines). Active mining ceased in Marowijne in 2015.

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 following mining. The overburden also may contain valuable nutrients and microbes essential for the effective reestablishment of native vegetation.

Overburden and any rock removed to access the bauxite ore and coal are generally returned to the mine pits. Wherever possible, any removed topsoil and overburden is moved to landscaped areas over pits that recently have been filled—a process called progressive rehabilitation or direct return. In some situations, it is not possible or practical to return all of

the overburden to a mine pit. In these cases, the overburden is stockpiled for future management. The stockpile areas are rehabilitated once they are no longer active.

In certain locations, overburden containing naturally occurring sulfide minerals has 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 is 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 diversity, seed production rate, the density of accumulated organic materials (known as litter 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 studies of surface water and groundwater volumes and quality.

Many strategies are applied 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 use cuttings and tissue culture propagation for species that generally don't produce viable seeds. In many instances, we create and supervise our own nurseries to ensure high-quality planting stock.

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



Carefully selected logs with hollows and large cracks for animal habitats

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.

Our Juruti mine in Brazil continues to innovate in the area of rehabilitation. Most recently, it has 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.

In Suriname, our Suralco operations developed an integrated closure planning framework to facilitate viable and sustainable future land use for mined out areas. We submitted closure plans for five mine sites to the government for review. For the Peto Hill mine site in eastern Suriname, we received comments in the first quarter of 2015 and rehabilitated the location in the fourth quarter. In accordance with the desires of the local community, this area was rehabilitated for use in shifting cultivation. We obtained conceptual approval for closure of the Lelydorp II/III mine in late 2015.

Impact on Indigenous Peoples

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

In Australia, we have 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.

We have engaged with the traditional community of Juruti Velho, located at Vila Muirapinima, since the inception of our Juruti mine in the Brazilian 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, INCRA (land tenure authority), and 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 2015, we paid approximately US\$14.2 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

2015 on the value of the compensation and method of payment.

REMEDIATION

As science and technology advanced throughout the more than 125 years since Alcoa's founding, we have adapted our manufacturing practices to minimize their impact on the environment. Unfortunately, some of our historical practices, which were legal and acceptable in their time, have resulted in the contamination of soil, sediments, and groundwater.

In 2015, we spent approximately US\$43 million to address more than 250 ongoing 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 we undertake is the protection of human health and the environment. There are challenges in meeting this goal, as we must first collect sufficient information using sound scientific assessments to understand the nature of the environmental condition. Another challenge is identifying remedial solutions that are protective, feasible, and economically sound. The third and possibly greatest challenge is balancing multiple needs, desires, and expectations within Alcoa, the community, and regulatory authorities while keeping science as the driver in selecting a remedial approach. The identified risks ultimately must be addressed to the satisfaction of key stakeholders.

Significant remediation projects in 2015 included the closure of two former bauxite residue storage areas in the United States and St. Croix and the remediation of mine spoils and contaminated sediments at locations within the United States. We also initiated work on two sediment remediation projects in Canada and Norway.



FACILITY END-OF-LIFE STRATEGY

Whenever we close one of our facilities, we work closely with relevant stakeholders to develop an end-of-life strategy that positions the facility for reuse or redevelopment so the strength and viability of the community can be retained. Some facilities can be reused with few changes. Others may require remediation, modification, or even demolition before they or the land on which they are located can be repurposed.

Our asset management policy covers the entire facility life cycle, including planning for end of life. We continued implementation of the policy in 2015, with 16 locations that are close to the end of their operational lives having management plans in place during the year. Our long-term goal is to develop a plan for every location.

A major focus of our work in 2015 was decommissioning and remediating the 525-hectare (1,297-acre) site housing the Point Henry smelter and rolling mill in Australia, both of which we closed in 2014. In December 2015, we launched Point Henry 525, which is a formal program to work with the community and other stakeholders to craft a master plan for the location's redevelopment.

We also closed our Yennora rolling mill in Australia at the end of 2014. We sold the 32-hectare (79-acre) property to an industrial development firm, and we began remediating and selectively demolishing buildings in 2015 to support the buyer's plans. This cooperative arrangement allows the buyer to get usable space on the market immediately by repurposing select existing buildings, thereby accelerating job growth in the community.

In the United States, we sold 32 hectares (80 acres) of former industrial land in Louisiana and 417 hectares (1,031 acres) in Texas to two companies that export liquefied



U.S. bauxite residue storage area before (left) and near the end of remediation

natural gas. Each company has permitted the land to develop liquefaction facilities, with associated infrastructure and ports.

We permanently closed our Massena East smelter facility in upstate New York (USA) in 2015 and began engaging with the government on remediation plans.

At our closed smelter in Fusina, Italy, we completed the removal of materials and aluminum-specific equipment in the potroom in March 2015. We began demolishing smelter buildings and remediating the site in accordance with government agreements during the year.

Throughout 2015, we continued to work 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 are designed to prepare the location for redevelopment.

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Appendix

2015 Awards

GLOBAL

Dow Jones Sustainability Index (14th year)

Alcoa

S&P 500 Climate Disclosure Leadership Index—Carbon Disclosure Project

Alcoa

Most Admired Metals Company in the World—Fortune Magazine

Alcoa

2016 Corporate Equality Index (100% rating)—Human Rights Campaign Foundation

Alcoa

Metals Company of the Year—Platts

Alcoa

Green Brand Pillar Supplier Award—Ford Motor Company

Alcoa

Lead Supplier Award—Korea Aerospace Industries

Alcoa

Most Admired Corporate Dealmaker—The Deal

Alcoa

Supply Chain and Quality Improvement Program Best Improver Award 2015—Airbus

Alcoa Fastening Systems & Rings

International Team of Excellence Award (bronze)—American Society of Quality

Alcoa Power and Propulsion

ASIA

Safran Supplier Performance Award—Snecma

Alcoa Fastening Systems & Rings—Suzhou, China

Provincial Safety Model Enterprise—Hebei Provincial Safety Supervision Bureau

Alcoa Bohai Aluminum Industries Company Limited

Corporate Social Responsibilities Award—Qinhuangdao PR Association

Alcoa Bohai Aluminum Industries Company Limited

Certificate of Work Safety Standardization (second class)—Hebei Provincial Safety Production Supervision and Management Bureau

Alcoa Bohai Aluminum Industries Company Limited

Excellent Supplier—Yongqiang Vehicle Manufacturing (Dong Guan)

Alcoa Bohai Aluminum Industries Company Limited

Outstanding Supplier—Hebei Changhua Vehicle Manufacturing

Alcoa Bohai Aluminum Industries Company Limited

Good Partner of BYD—BYD Vehicle Manufacturing

Alcoa Bohai Aluminum Industries Company Limited

2015 Excellent Supplier—SNTO Group

Alcoa Bohai Aluminum Industries Company Limited

Excellent Volunteer Team—Kunshan Volunteer Association

Alcoa Kunshan Aluminum Products Company Limited

Sustainable Innovation—2015 China Summit on Caring for Climate

Alcoa (China) Investment Company Limited

5 Years Plus Caring Company Logo Recipient—Hong Kong Council of Social Service

Alcoa International (Asia) Limited

Certificate of Appreciation—Mitsubishi Hitachi Power Systems

Alcoa Power & Propulsion—Nomi, Japan

AUSTRALIA

Employer of Choice for Gender Equality—Workplace Gender Equality Agency

Alcoa of Australia

EUROPE

Silver Certificate—Turbomeca

Alcoa Power and Propulsion—Dives and Gennevilliers, France

Janus the Living Space Award—French Design Institute

Kawneer France—Vendargues, France

Gold Innovation Award (outdoor fittings)—BATIMAT

Kawneer France—Vendargues, France

Workplaces, Architecture, Environment Award—AMO National

Kawneer France—Vendargues, France

Supply Chain and Quality Improvement Program Best Improver Award 2015—Airbus

Alcoa Power and Propulsion TITAL—Bestwig, Germany

Supplier Performance Award (delivery and quality performance)—Snecma

Alcoa Power and Propulsion TITAL—Bestwig, Germany

EMIL Environmental Project of the Year Award—Norsk Energi

Alcoa Global Primary Products—Lista, Norway

Captain of Russian Business Award—Human Resources Management Magazine

Alcoa Russia

Best Producer of Rolled Aluminum Products—Metals Supplies and Sales Magazine

Alcoa Samara—Samara Russia

South West Regional Health and Safety Award (runner up)—EEF

Alcoa Power and Propulsion—Exeter, United Kingdom

Manufacturing Champion (manufacturing team and energy champion)—The Manufacturing Institute

Alcoa Global Rolled Products—Kitts Green, United Kingdom

NORTH AMERICA

Top Five Places to Work in Mexico—Great Place to Work® Institute

Alcoa Wheel Products Mexico—Monterrey, Mexico

Impartiality Award—Great Place to Work® Institute

Alcoa Wheels Products Mexico—Monterrey, Mexico

Employer of Choice—Expansion Magazine

Alcoa Wheels Products Mexico—Monterrey, Mexico

Top 20 Product in 2015 (Alcoa Ultra One™ Wheel with Magnaforce™ alloy)—Heavy Duty Trucking Magazine

Alcoa

2015 Automotive Leadership Award (supplier category)—Detroit Free Press

Alcoa

Mach 5 Certification—Aero Montreal

Alcoa Titanium and Engineered Products—Laval, Canada

Spirit of Lethbridge—Lethbridge Chamber of Commerce

Kawneer Lethbridge—Lethbridge, Canada

2015 CASA Award for Community Support—CASA

Alcoa Forgings and Extrusions—Lafayette, Indiana, USA

2015 Making Strides against Breast Cancer Award—Lafayette American Cancer Society

Alcoa Forgings and Extrusions—Lafayette, Indiana, USA

Gold Safety Award (42nd consecutive year)—North Carolina Department of Labor

Alcoa Power Generating Inc. (Yadkin Division)—Badin, North Carolina, USA

2015 International Business of the Year—World Trade Center Savannah

Alcoa Forgings and Extrusions—Savannah, Georgia, USA

Inaugural Environmental Star Award—Ferndale Chamber of Commerce

Alcoa Intalco Works—Ferndale, Washington, USA

SOUTH AMERICA

Gold Certification (fifth year)—Brazilian Greenhouse Gas Protocol Program

Alcoa Brazil

One of the Best Companies to Work for in Brazil—Great Place to Work® Institute with Época Magazine

Alcoa Brazil

One of the Best Places to Start a Career in Brazil—Você S/A Magazine

Alcoa Brazil

The Best and Biggest—Exame Magazine

Alcoa Brazil

Benchmarking Brazil Award 2015—Benchmarking Brazil Program

Alumar—São Luís, Brazil

Human Being Award 2015—Brazilian Human Resources Association/Maranhão

Alumar—São Luís, Brazil

Protection Award Brazil (occupational hygiene category)—Proteção Magazine

Juruti Mine—Juruti, Brazil

16º Award on Excellence in the Brazilian Mining and Metallurgical Industry—Minérios & Minerales Magazine

Juruti Mine—Juruti, Brazil

SPONSORIUM Award 2014 (community investment category)—SPONSORIUM

Instituto Alcoa

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Global Reporting Initiative Index

This index was developed to help interested readers compare the information in Alcoa's online sustainability reporting and Annual Report and on our website with the [Global Reporting Initiative \(GRI\) G4 guidelines](#). We also draw

upon criteria from other organizations to frame our sustainability reporting.

This report is in accordance with the "core" option of the G4 guidelines.

General Standard Disclosures

Indicator	Description	Location
Strategy & Analysis		
G4-1	Statement from the most senior decision-maker of the organization about the relevance of sustainability to the organization and its strategy for addressing sustainability.	CEO Statement (page 2) CSO Statement (page 3)
G4-2	Description of key impacts, risks and opportunities.	Opportunities & Risks (page 15) Sustainability Strategy (page 6)
Organizational Profile		
G4-3	Name of the organization.	Alcoa Inc.
G4-4	Primary brands, products, and services.	Alcoa Corporate Overview → go
G4-5	Location of organization's headquarters.	New York City, USA
G4-6	Number of countries where the organization operates, and names of countries where the organization has significant operations or that are specifically relevant to the sustainability topics covered in the report.	Locations → go
G4-7	Nature of ownership and legal form.	Formed in 1888 under the laws of the Commonwealth of Pennsylvania, Alcoa Inc. is a publicly listed company on the New York Stock Exchange (NYSE ticker symbol: AA)
G4-8	Markets served.	→ go
G4-9	Scale of the reporting organization.	Company Overview → go Annual Report (page 4) → go
G4-10	Employee breakdown by employment type, gender, region, contractors, etc.	Our People (page 27)
G4-11	Percentage of total employees covered by collective bargaining agreements.	Our People (page 27)
G4-12	Describe the supply chain.	Supply Chain (page 44)
G4-13	Significant changes during the reporting period regarding the organization's size, structure, ownership or supply chain.	2016 Proxy Statement (stock ownership information on pages 32-34) → go
G4-14	Whether or how the precautionary approach or principle is addressed by the organization.	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. → go

Indicator	Description	Location
G4-15	Externally developed economic, environmental, and social charters, principles, or other initiatives to which the organization subscribes or which it endorses.	Assurance (page 13)
G4-16	Memberships of associations and national or international advocacy organizations in which the organization holds a position on the governance body, participates in projects or committees, provides substantive funding beyond routine membership dues, or views as strategic.	Alcoa Stakeholder List (page 93) Climate Protection (page 56)
Identified Material Aspects and Boundaries		
G4-17	All entities included in the organization's consolidated financial statements and whether any included entity is not covered by the report.	Annual Report (pages 96 and 184) → go All entities included in the consolidated financial statements are included in the sustainability report. Page 96 explains the principles of consolidation, and page 184 includes a list of significant subsidiaries.
G4-18	Process for defining the report content and the aspect boundaries and how the organization has implemented the Reporting Principles for Defining Report Content	Reporting & Materiality (page 10)
G4-19	All identified material aspects.	Reporting & Materiality (page 10)
G4-20	For each material aspect, the boundary within the organization.	Reporting & Materiality (page 10)
G4-21	For each material aspect, the boundary outside the organization.	Reporting & Materiality (page 10)
G4-22	The effect of any restatements of information provided in previous reports, and the reasons for such restatements.	Provided primarily as footnotes to individual charts where data changed.
G4-23	Significant changes from previous reporting periods in the scope and aspect boundaries.	There were no significant changes.
Stakeholder Engagement		
G4-24	Stakeholder groups engaged by the organization.	Stakeholder Engagement (page 46) Alcoa Stakeholder List (page 93)
G4-25	Basis for identification and selection of stakeholders with whom to engage.	Stakeholder Engagement (page 46) We identify stakeholders as those individuals or groups who have an interest in, or influence on, the company.
G4-26	Approaches to stakeholder engagement, including frequency of engagement by type and by stakeholder group and if undertaken specifically as part of the report preparation process.	Stakeholder Engagement (page 46)
G4-27	Key topics and concerns that have been raised through stakeholder engagement, broken down by stakeholder group, and how the organization has responded to those key topics and concerns, including through its reporting.	Stakeholder Engagement (page 46)

Indicator	Description	Location
Report Profile		
G4-28	Reporting period.	2015
G4-29	Date of most recent report.	2014
G4-30	Reporting cycle.	Annual
G4-31	Contact point for questions regarding the report or its contents.	Jamie Mackay Director, Global Environmental Compliance & Sustainability
G4-32	In accordance option and GRI content index.	Core option
G4-33	External assurance.	Assurance (page 13)
Governance		
G4-34	Governance structure of the organization.	Directors → go Board Committees → go
G4-35	Process for delegating authority for economic, environmental and social topics from the highest governance body to senior executives and other employees.	Public Issues Committee → go Audit Committee → go The Public Issues Committee, comprised solely of independent directors, provides guidance on matters relating to the company's corporate social responsibility and advises on current and emerging political, social, and environmental issues and developments. Economic matters are overseen by the Audit Committee, which consists solely of independent directors. The Board of Directors authorizes actions to be taken by relevant company personnel as it deems appropriate.
G4-36	Executive-level position(s) with responsibility for economic, environmental, and social topics, and whether post holders report directly to the highest governance body.	Alcoa's chairman and 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 executive vice president of human resources and environment, health, safety, and sustainability has responsibility for environmental and social topics. Both report to the chairman and CEO.
G4-37	Processes for consultation between stakeholders and the highest governance body on economic, environmental and social topics. If consultation is delegated, describe to whom and any feedback processes to the highest governance body.	Public Issues Committee → go Stakeholder Engagement → go
G4-38	Composition of the highest governance body and its committees.	Directors → go Board Committees → go

Indicator	Description	Location
G4-39	Report whether the chair of the highest governance body is also an executive officer and, if so, his or her function within the organization's management and the reasons for this arrangement.	<p>2016 Proxy Statement (page 23) → go</p> <p>The chairman of the board is the chief executive officer of Alcoa.</p> <p>By serving in both positions, the chairman and CEO is able to draw on his detailed knowledge of the company to provide the board leadership in focusing its discussions and review of the company's strategy. In addition, a combined role of chairman and CEO ensures that the company presents its message and strategy to its stakeholders with a unified voice. It also allows for efficient decision making and focused accountability.</p> <p>Alcoa has a strong, independent lead director, and this role provides an appropriate organizational structure for the independent directors to provide independent oversight of management. The lead director reviews agendas for the meetings and presides over executive sessions of the independent directors at each regularly scheduled board meeting.</p>
G4-40	Nomination and selection processes for the highest governance body and its committees.	<p>Corporate Governance Guidelines → go</p> <p>Governance and Nominating Committee → go</p>
G4-41	Process for the highest governance body to ensure conflicts of interest are avoided and managed and if conflicts of interest are disclosed to stakeholders.	<p>Corporate Governance → go</p> <p>Business Conduct Policies → go</p> <p>Related Person Transaction Approval Policy → go</p> <p>Governance and Nominating Committee → go</p> <p>2016 Proxy Statement (pages 28-29) → go</p>
G4-42	Highest governance body's and senior executives' roles in the development, approval, and updating of the organization's purpose, value or mission statements, strategies, policies, and goals related to economic, environmental and social impacts.	<p>Public Issues Committee → go</p> <p>Audit Committee → go</p> <p>Executive Council → go</p>
G4-43	Measures taken to develop and enhance the highest governance body's collective knowledge of economic, environmental and social topics.	<p>Public Issues Committee → go</p> <p>Audit Committee → go</p>
G4-44	Process for the evaluation of the highest governance body's performance with respect to governance of economic, environmental and social topics and actions taken in response to such governance.	<p>2016 Proxy Statement (page 25) → go</p> <p>The Board of Directors annually assesses the effectiveness of the full board, the operations of its committees, and the contributions of director nominees.</p>
G4-45	Highest governance body's role in the identification and management of economic, environmental and social impacts, risks, and opportunities and if stakeholder consultation is used to support this.	<p>Public Issues Committee → go</p> <p>Audit Committee → go</p> <p>2016 Proxy Statement (pages 24; 26-27) → go</p>

Indicator	Description	Location
G4-46	Highest governance body's role in reviewing the effectiveness of the organization's risk management processes for economic, environmental and social topics.	2016 Proxy Statement (page 24) → go Public Issues Committee → go
G4-47	Frequency of the highest governance body's review of economic, environmental and social impacts, risks, and opportunities.	Alcoa's Board of Directors and its committees review impacts, risks, and opportunities at regularly scheduled board/committee meetings five to six times annually.
G4-48	Highest committee or position that formally reviews and approves the organization's sustainability report and ensures that all material aspects are covered.	The draft Sustainability Report is provided to the Public Issues Committee of the Board of Directors.
G4-49	Process for communicating critical concerns to the highest governance body.	Shareholders and employees can communicate any concerns to Alcoa's Board of Directors through: <ul style="list-style-type: none"> • Regular mail, addressed to Lead Director, c/o Alcoa Inc., Corporate Secretary's Office, 390 Park Avenue, New York, NY 10022-4608, USA; • Regular mail, addressed to Audit Committee, c/o Alcoa Inc., Corporate Secretary's Office, 390 Park Avenue, New York, NY 10022-4608, USA; • Integrity Line; • Shareholder resolutions; • Shareholder recommendations for director nominees; • Shareholder nominations from the floor of the annual meeting; and • Union representation or work councils.
G4-50	Nature and total number of critical concerns that were communicated to the highest governance body and the mechanism(s) used to address and resolve them.	Stakeholder Engagement (page 46)
G4-51	Remuneration policies for the highest governance body and senior executives.	2016 Proxy Statement (pages 19-21 and 39-68) → go
G4-52	Process for determining remuneration.	2016 Proxy Statement (pages 19-21 and 39-68) → go
G4-53	How stakeholders' views are sought and taken into account regarding remuneration.	2016 Proxy Statement (pages 40-41; 59) → go
G4-54	Ratio of the annual total compensation for the organization's highest-paid individual in each country of significant operations to the median annual total compensation for all employees.	This information is not provided because the disclosure is not currently required under SEC reporting rules, it requires significant time and effort, and the information will change when Alcoa separates. We anticipate reporting this information beginning in 2018.
G4-55	Ratio of percentage increase in annual total compensation for the organization's highest-paid individual in each country of significant operations to the median percentage increase in annual total compensation for all employees.	This information is not provided because it is not tracked. We do not anticipate reporting this information in the near future.

Ethics and Integrity

G4-56	Describe the organization's values, principles, standards and norms of behavior, such as codes of conduct and codes of ethics.	Alcoa Values → go Human Rights Policy → go Business Conduct Policies → go Code of Ethics → go Ethics and Compliance Program → go
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Indicator	Description	Location
G4-57	Report the internal and external mechanism for seeking advice on ethical and lawful behavior, and matters related to organizational integrity, such as helplines or advice lines.	Ethics and Compliance Program → go Integrity Line → go
G4-58	Report the internal and external mechanisms for reporting concerns about unethical or unlawful behavior, and matters related to organizational integrity, such as escalation through line management, whistleblowing mechanisms or hotlines.	Ethics and Compliance Program → go Integrity Line → go

Specific Standard Disclosures

Indicator	Description	Location
Emissions		
G4-EN15	Direct greenhouse gas emissions (Scope 1).	Climate Protection (page 56) Assurance (page 13)
G4-EN16	Energy indirect greenhouse gas emissions (Scope 2).	Climate Protection (page 56)
G4-EN17	Other indirect greenhouse gas emissions (Scope 3).	Climate Protection (page 56)
G4-EN18	Greenhouse gas emissions intensity.	Climate Protection (page 56)
G4-EN19	Reduction of greenhouse gas emissions.	Climate Protection (page 56)
G4-EN20	Emissions of ozone-depleting substances.	Emissions (page 65)
G4-EN21	NOx, SOx, and other significant air emissions.	Emissions (page 65)
Energy		
G4-EN3	Energy consumption within the organization.	Energy (page 59) We report our direct energy consumption and purchased electricity consumption by fuel source. Our energy consumption for heating and cooling is included in our direct energy and purchased electricity consumption numbers and is not directly purchased from outside entities. We also do not sell energy for these purposes.
G4-EN4	Energy consumption outside of the organization.	Products (page 19)
G4-EN5	Energy intensity.	Energy (page 59)
G4-EN6	Reduction of energy consumption.	Energy (page 59)
G4-EN7	Reductions in energy requirements of products and services.	Products (page 19)
Water		
G4-EN8	Total water withdrawn by source.	Water (page 62)

Indicator	Description	Location
Health and Safety		
G4-LA5	Percentage of total workforce represented in formal joint management-worker health and safety committees that help monitor and advise on occupational health and safety programs.	Health (page 39)
G4-LA6	Type of injury and rates of injury, occupational diseases, lost days, and absenteeism, and total number of work-related fatalities, by region and by gender.	Safety (page 34) Health (page 39) 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.
G4-LA7	Workers with high incidence or high risk of diseases related to their occupation.	Health (page 39) Although the potential for risk exists within our various operations, we implement stringent and comprehensive mitigation and prevention efforts. These include industrial hygiene monitoring, engineering controls, personal protective equipment, ergonomic programs, and medical oversight. In addition, our global wellness program addresses the most important aspects of personal health and well-being.
G4-LA8	Health and safety topics covered in formal agreements with trade unions.	Health (page 39)
Economic Performance		
G4-EC1	Direct economic value generated and distributed.	Economic Performance (page 53) Annual Report → go Countries of operation that are either candidate to or compliant with the Extractive Industries Transparency Initiative are Guinea, Indonesia, Norway, and Trinidad and Tobago.
G4-EC2	Financial implications and other risks and opportunities for the organization's activities due to climate change.	Climate Protection (page 56)
G4-EC3	Coverage of the organization's defined benefit plan obligations.	Annual Report (pages 150-158) → go
G4-EC4	Financial assistance received from government.	Annual Report (pages 39-41; 128-130) → go 2015 Alcoa Form 10-K → go
Effluents and Waste		
G4-EN22	Total water discharge by quality and destination.	Water (page 62)
G4-EN23	Total weight of waste by type and disposal method.	Waste & Emissions (page 65)
G4-EN24	Total number and volume of significant spills.	→ go
MM3	Total amounts of overburden, rock, tailings, and sludges and their associated risks.	Bauxite Residue (page 66) Mine Rehabilitation (page 74) Our primary residue is bauxite residue. We do not consider overburden and rock as waste since this is used in our mine rehabilitation.

Indicator	Description	Location
Local Communities		
G4-SO1	Percentage of operations with implemented local community engagement, impact assessments and development programs.	Stakeholder Engagement (page 46)
G4-SO2	Operations with significant actual and potential negative impacts on local communities.	Potential impacts include: <ul style="list-style-type: none"> • Dusting from the bauxite residue storage areas at all of our refineries. • Noise issues associated with many of our locations, especially those in close proximity to communities.
MM6	Number and description of significant disputes relating to land use, customary rights of local communities, and indigenous peoples.	Stakeholder Engagement (page 46)
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 (page 46)
Biodiversity		
G4-EN11	Operational sites owned, leased, managed in, or adjacent, to protected areas and areas of high biodiversity value outside protected areas.	Land Management (page 72)
G4-EN12	Description of significant impacts of activities, products, and services on biodiversity in protected areas and areas of high biodiversity value outside protected areas.	Land Management (page 72)
G4-EN13	Habitats protected or restored.	Land Management (page 72)
MM1	Amount of land (owned or leased, and managed for productive activities or extractive use) disturbed or rehabilitated.	Land Management (page 72)
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 (page 72)
Training and Education		
G4-LA 9	Average hours of training per year per employee by gender and employee category	Our People (page 27)
G4-LA11	Percentage of employees receiving regular performance and career development reviews.	Our People (page 27)
Products and Services		
G4-EN27	Extent of impact mitigation of environmental impacts of products and services	Net Positive (page 17)

Sector-specific Aspects

Indicator	Description	Location
Artisanal and Small-scale Mining		
MM8	Number (and percentage) of company operating sites where artisanal and small-scale mining (ASM) 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.
Resettlement		
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 2015.

Indicator	Description	Location
Closure Planning		
MM10	Number and percentage of operations with closure plans.	Land Management (page 72)
Emergency Preparedness		
DMA	Information on the existence of emergency plans, how they are prepared, and their content.	Safety (page 34)
Materials Stewardship		
MM11	Programs and progress relating to materials stewardship.	Recycling (page 25) Safety Data Sheets → go

Some GRI descriptions are edited for length. For the complete guidelines, please visit www.globalreporting.org.

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2015 Safety Data

Fatalities

Employees and supervised contractors/ non-supervised contractors

	Global	Asia	Australia	Europe	North America	South America
2011	0/1	0	0	0/1	0	0
2012	2/0	0	0	0	2/0	0
2013	0	0	0	0	0	0
2014	0/1	0	0	0	0/1	0
2015	4/1	0	0/1	0	3/0	1/0

Fatalities by Gender

Employees and all contractors

	Male	Female	Total
2011	1	0	1
2012	2	0	2
2013	0	0	0
2014	1	0	1
2015	5	0	5

Lost Workday Rate

Employees and supervised contractors

	U.S. Manufacturing Global Average	Asia	Australia	Europe	North America	South America	
2011	0.12	1.1	0.06	0.39	0.16	0.12	0.07
2012	0.13	1.1	0.27	0.47	0.10	0.12	0.07
2013	0.09	1.0	0	0.32	0.06	0.07	0.09
2014	0.10	1.0	0.11	0.35	0.05	0.10	0.04
2015	0.10		0	0.17	0.07	0.11	0.09

The 2015 Bureau of Labor Statistics U.S. manufacturing industry average is not available. 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
2011	82	11	93
2012	76	14	90
2013	49	7	56
2014	57	8	65
2015	54	5	59

Lost Workday Rate

Non-supervised contractors

	Global	Asia	Australia	Europe	North America	South America
2011	0.12	1.71	0.26	0.44	0.23	0.03
2012	0.04	0	0.28	0.20	0.23	0.06
2013	0.04	0	0.25	0.08	0.07	0.05
2014	0.12	0.80	0.28	0.12	0.25	0.02
2015	0.15	0	0.13	0.31	0.32	0

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
2011	27	4	31
2012	22	1	23
2013	12	1	13
2014	18	1	19
2015	17	0	17

Days Away, Restricted, and Transfer Rate

Employees and supervised contractors

	U.S. Manufacturing Global Average	Asia	Australia	Europe	North America	South America	
2011	0.78	2.4	0.40	1.46	0.56	0.90	0.36
2012	0.50	2.4	0.37	1.41	0.27	0.60	0.21
2013	0.35	2.2	0.15	0.96	0.19	0.37	0.22
2014	0.32	2.2	0.11	0.65	0.16	0.38	0.16
2015	0.31		0	0.39	0.20	0.38	0.11

The 2015 Bureau of Labor Statistics U.S. manufacturing industry average is not available. 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
2011	424	75	499
2012	295	53	348
2013	195	34	229
2014	178	21	199
2015	152	28	180

Days Away, Restricted, and Transfer Rate

Non-supervised contractors

	Global	Asia	Australia	Europe	North America	South America
2011	0.29	1.71	0.98	0.55	0.59	0.28
2012	0.12	0	0.94	0.28	0.35	0.26
2013	0.18	0	0.99	0.21	0.77	0.22
2014	0.28	0.80	0.85	0.33	0.40	0.14
2015	0.34	0.85	0.45	0.69	0.44	0.10

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
2011	67	1	68
2012	57	3	60
2013	52	8	60
2014	40	4	44
2015	30	4	34

Total Recordable Incident Rate

Employees and supervised contractors

	Alcoa	U.S. Manufacturing Average
2005 Baseline	1.48	5.6
2011	1.24	4.4
2012	1.07	4.3
2013	0.98	4.0
2014	1.14	4.0
2015	1.08	
2020 Goal	0.68	
2030 Goal	0.19	

Goal: 0.68

Progress: As of Dec. 2015 **1.08**

The 2015 Bureau of Labor Statistics U.S. manufacturing industry average is not available. Total recordable incident rate represents the number of injuries and illnesses resulting in days away from work, job transfer or restriction, medical treatment, or other recordables per 100 full-time workers.

Total Recordable Incident Rate by Region

Employees and supervised contractors

	Asia	Australia	Europe	North America	South America
2011	0.80	2.98	0.80	1.52	0.59
2012	0.80	2.53	0.54	1.33	0.46
2013	0.46	2.04	0.48	1.19	0.45
2014	0.73	1.77	0.52	1.46	0.44
2015	0.44	1.18	0.58	1.36	0.41

Total Recordable Incidents by Gender

Employees and supervised contractors

	Male	Female	Total
2011	732	125	857
2012	622	111	733
2013	552	77	629
2014	624	87	711
2015	535	81	616

Total Recordable Incident Rate

Non-supervised contractors

	Global	Asia	Australia	Europe	North America	South America
2011	0.51	6.00	1.95	0.77	0.94	0.58
2012	0.30	1.41	1.79	0.52	0.94	0.58
2013	0.37	0	2.03	0.34	1.10	0.53
2014	0.69	3.20	1.81	0.53	0.89	0.57
2015	0.91	2.55	1.60	1.18	0.93	0.53

Because contractors not directly supervised by Alcoa maintain their own health and safety programs and are accountable for investigating incidents involving their employees, certain details associated with their internal investigations are not fully transparent to Alcoa.

Total Recordable Incidents by Gender

Non-supervised contractors

	Male	Female	Total
2011	122	10	132
2012	142	7	149
2013	96	8	104
2014	107	10	117
2015	83	7	90

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Alcoa Stakeholders

MEMBERSHIPS

As a leader in the lightweight metals industry, we believe it is our responsibility to help shape the direction of the industry to ensure it is continually improving and moving toward a more sustainable future.

One of the ways we do this is through significant participation in industry organizations. Many of our senior leaders and experts serve as officers, committee members, and sources of industry information. We are also a member of organizations focused on major issues facing our industry, such as climate change.

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

- Advanced Manufacturing Partnership 2.0
- Aerospace Industries Association
- Aircraft Fleet Recycling Association
- American Architectural Manufacturers Association
- American Society for Testing and Materials
- Aluminum Association of Canada
- Aluminum Stewardship Initiative
- ASM International
- Australian Aluminium Council
- Brazilian Aluminum Association
- Business Council of Australia
- Can Manufacturers Institute
- Catalyst Europe
- ENERGY STAR
- European Aluminium Association
- Glass Association of North America
- International Aluminium Institute
- Lightweight Innovations of Tomorrow
- National Association of Manufacturers
- National Fenestration Rating Council
- The Aluminum Association
- The Business Roundtable
- U.S.-Russia Business Council
- World Economic Forum
- World Resources Institute

STAKEHOLDERS

Following is a partial listing of stakeholders we have consulted, listened to, or partnered with recently on sustainability issues. It should be noted that inclusion on this list does in no way indicate that these organizations either support or oppose Alcoa's activities. We have engaged with them, both formally and informally, to solicit their views on our business initiatives.

In addition to these organizations, we have intensive interface, dialogue, and partnerships with countless government agencies at all levels in all the countries where we operate.

International

American Forests Global ReLeaf
Center for Automotive Research
Center for Climate and Energy Solutions
Cradle to Cradle Products Innovation Institute
Earthwatch Institute
Institute of International Education
International Living Future Institute
World Resources Institute

Europe

American Chamber of Commerce to the European Union
BusinessEurope
Career Women Forum
Catalyst Europe
Center for European Policy Studies
Climate Action Network Europe
College of Europe
Conservation of Arctic Flora and Fauna (CAFF)
Corporate Social Responsibility Europe
Eurometaux
European Aluminium Association
European Coil Coating Association (ECCA)
European Foundation Centre
European Partners for the Environment
Friends of Europe
Fund for Sustainable Development
Human Rights Watch
IESE School of Business
IE Business School
Economics for Energy
Fundación La Laboral—Centro de Arte y Creación Industrial
Institute for European Environmental Policy
International Union for the Conservation of Nature (IUCN)
Oxfam International
The European Organization for Nuclear Research (CERN)
World Social Forum

National

Australia

AMIRA International
ANGAIR
Angelsea Surf Life Saving Club

Australian Aluminium Council
Australian Industry Group
Australian Institute of Management
Australian Renewable Energy Agency
Bunbury Wellington Economic Alliance
Business Council of Australia
Celebrate WA
Chamber of Commerce and Industry of Western Australia Inc
City of Greater Geelong
City of Kwinana
City of Mandurah
City of Portland
Committee for Economic Development of Australia
Committee for Geelong
Committee for Portland
Commonwealth Scientific and Industrial Research Organisation
Consulate General of the United States, Perth
Curtin University of Technology
Deakin University
DomGas Alliance
Fairbridge Western Australia Inc
G21 Alliance (Geelong)
Geelong Chamber of Commerce
Geelong Environment Council
Geelong Manufacturing Council
Give Where You Live Geelong
Glenelg Shire Council
Greening Australia
Gunditj Mirring Traditional Owners Aboriginal Corporation
International Aluminium Institute
Kwinana Industries Council
Mandurah Performing Arts Centre
Minerals and Energy Research Institute of Western Australia
Minerals Council of Australia
Munda Biddi Trail Foundation
Murdoch University
Northern Land Council
Perth Region Natural Resource Management
Portland District Health
Royal Melbourne Institute of Technology University
Scitech
Sculpture by the Sea
Shire of Harvey
Shire of Murray
Shire of Waroona
South West Development Commission
South West Institute of TAFE
The Chamber of Minerals and Energy of Western Australia Inc
The Workplace Gender Equality Agency
United Way Glenelg

University of Western Australia
Volunteering WA
Western Australian Chemistry Centre
Winda-Mara Aboriginal Cooperation
Youth Focus

Belgium

University of Hasselt—CleanTech

Brazil

Akatu Institute
American Chamber of Commerce (AMCHAM)
American Embassy
Association of the Aluminum Profile Manufactures of the Rio de Janeiro State (AFEARJ)
Association of the Directors of Companies of the Real State Market (ADEMI)
Brazilian Aluminum Association (ABAL)
Brazilian Biodiversity Fund (FUNBIO)
Brazilian Business Council for Sustainable Development (CEBDS)
Brazilian Mining Institute (IBRAM)
Brazilian Service for Assistance to Small Business Enterprises (SEBRAE)
Catholic University of Minas Gerais/Poços de Caldas (PUC-MG)
Cebri
Comunitas
Conservation International Brazil
Dialogue Group on Mining, Democracy and Sustainable Development (GDM)
Emilio Goeldi Museum of Para
Environment Foundation (FATMA)
Ethos Institute
Evoluir Cultural
Federal University of Santa Catarina
Federal University of São Carlos (UFSCar)
Federal University of West Para (UFOPA)
Federation of Assistencial Entities of Santo Andre
Federation of Para Industry (FIEPA)
Getulio Vargas Foundation Center of Sustainability Studies (GVCes)
Green Building Council
Industry's Social Service Organization (SESI)
Institute, Foundations and Companies Group (GIFE)
International Socio-environmental Fund (FICAS)
National Association of the Aluminum Profiles (AFEAL)
National Industrial Learning Service (SENAI)
National Industry Confederation (CNI)
National Institute of Colonization and Agrarian Reform (INCRA)
National Trade Learning Service (SENAC)

National Water Agency (ANA)
 Natura Cosmetics SA
 Nossa São Luis Movement
 Nossa São Paulo Movement
 Santa Catarina Town Hall
 Sustainable Amazon Forum (FAS)
 Sustainable Idea
 Sustainable Poços Association
 The Nature Conservancy Brazil
 Union of Mining Industries of the Para State (Simineral)
 University of Southern Santa Catarina
 Women's Forum

Canada

Academos
 À l'école « Moi j'bouge »
 Aluminum Association of Canada
 Artspec – Salle Luc Plamondon
 Arc-en-ciel pour Collations Santé Portneuf
 Association des économistes québécois (ASDEQ)
 Association québécoise des consommateurs industriels
 d'électricité (AQCIE)
 Board of Trade of Metropolitan Montreal
 Canards Illimités
 CAPSA
 CEGEP de Limoilou
 Centraide
 Centre de la Biodiversité du Québec
 Centre de pédiatrie sociale Centre-Sud
 Centre de prévention et de réadaptation de la Côte-nord
 Chambre de commerce et d'industries du Cœur du Québec
 Chambre de commerce et d'industries de Trois-Rivières
 Chambre de commerce secteur ouest de Portneuf
 Chinook High School
 Comité sectoriel de main-d'œuvre de la métallurgie
 du Québec
 Comité ZIP de la rive nord de l'Estuaire
 Commission scolaire La Riveraine
 Commission scolaire de Portneuf
 Comptoir alimentaire l'Escale
 Conseil de développement du loisir scientifique
 Conseil du patronat du Québec (CPQ)
 Conseil patronal de l'environnement du Québec (CPEQ)
 COOP Santé Portneuf/Saint-Basile
 Coopérative de solidarité Vallée Bras du Nord
 Corporation de développement communautaire de la
 MRC de Bécancour
 Corporation du Bois de l'Équerre
 Corporation des lieux historiques de Pont-Rouge
 Credit Valley Conservation Foundation
 École Polytechnique de Montréal
 École secondaire Jean-Paul II

Environnement JEUnesse
 Équiterre
 FEDMO—Répertoire des services, groupes et organismes
 de Portneuf
 Fédération des chambres de commerce du Québec (FCCQ)
 Folie Technique
 Fondation de l'athlète d'excellence du Québec
 Fondation de la Cité de la santé
 Fondatio du cégep de Trosi-Rivières
 Fondation du cancer du sein du Québec
 Fondation du collège Montmorency
 Fondation économique de Manicouagan
 Fondation les Amis de l'estacade
 Fondation Mira
 Groupe Scouts Saint-Raymond
 GUEPE
 Héma-Québec
 Innovation et développement Manicouagan
 Insertech
 Interfaith Food Bank
 Laval University
 Le Groupe CAI Global (Forum des dirigeants d'entreprises
 étrangères)
 Leucan- Défi têtes rasées
 Les filles et les sciences: un duo électrisant!
 Maison du développement durable
 Maison Grandi'Ose
 McGill University
 Moisson Mauricie—Centre-du-Québec
 Moisson Montréal
 Moisson Québec
 Mouvement québécois de la qualité (MQQ)
 Municipalité St-Pierre Les Becquets
 Musée de la civilisation
 Musée Pointe-à-Callière
 Neuvaction (BNQ 21000)
 Novae
 Opération Enfant Soleil
 Opération nez rouge
 Organisme de Bassins Versants Manicouagan (OBVM)
 Parc nature Pointe-Aux-Outardes
 Parc de la rivière Gentilly
 Pôle régional pour l'enseignement de la science et de la
 technologie (PREST)
 Recherche et sauvetage Rivière-à-Pierre
 Recycling Congress of Ontario
 Réserve mondiale de la biosphère Manicouagan-Uapishka
 Société d'aide au développement des collectivités de
 Nicolet-Bécancour (SADC)
 Société du Parc industriel et portuaire de Bécancour
 Technocentre en écologie industrielle
 Threads of Life

Tree Canada

Union des chambres de commerce et d'industrie de
Portneuf (UCCIP)

Union des producteurs agricoles (UPA)

Université de Montréal

Ville de Bécancour

YWCA Lethbridge and District

China

American Chamber of Commerce in China (AmCham China)

Beijing ShengTao Education Developing and
Innovating Institute

Cang Nan Primary School

Caochang Village Committee, Qinglong District,
Qinhuangdao

China Association of Enterprises with Foreign Investment

China Business Council for Sustainable Development

China Education Association for International Exchange

China Executive Leadership Academy Pudong

China Friendship Foundation for Peace and Development

Chongchuan Amity NGO Construction Center

Global CEO Advisory Council

Huaqiao Elderly Home

Huaqiao Xinyuan Social Development Service Center

International Business Leader Advisory Council for the
Mayor of Shanghai

Kunshan Charity Federation

Kunshan Huaqiao Center Primary School

Kunshan Volunteer Association

Kunshan Yifang Social Service

No.1 Primary School Attached to Jiangsu Nantong

Qinhuangdao Welfare Shelter

Qinhuangdao Environmental Protection Volunteer Association

Qinhuangdao Fire Protection Association

Qinhuangdao Birds Protection Association

Safe Kids

Shanghai Oasis Ecological Conservation and
Communication Center

Shanhaiguan Welfare Shelter

Shanghai Shoots and Roots

Sino-Union Create

Suzhou Industrial Park EHS organization

Suzhou Industrial Park Aerospace Association

Suzhou Industrial Park ShengPu Street Residential
Association

Suzhou Lovezone Federation

The Environmental Management Cadre College of China

The School of Management, University of Chinese Academy
of Sciences

The U.S.-China Business Council

Xiajing Village in Lulong of Qinhuangdao

Yanshan University

Yucai Migrant School

France

ADEFIM Training Subsidies Association

AFPI

Alsace Regional Office of Industry, Research and
Environment (DREAL)

ASASSP

Association Départementale des Amis et Parents d'Enfants
et Adultes Inadaptés de l'Ariège (ADAPEI)

Communauté de Communes des Coevrons

Commune de Merxheim et Communauté de Communes
de Guebwiller

Conseil Général de l'Ariège

Conseil Général de l'Hérault

Conseil Général du Haut-Rhin

Conseil Régional Languedoc-Roussillon

Ecole Ingénieurs Aéronautique Auto Spatial Ferroviaire
(ESTACA)

Ecole Nationale d'Architecture de Montpellier (ENAM)

Ecole Nationale Supérieure d'Architecture (ENSA)

Ecole Nationale Supérieure des Arts et Métiers (ENSAM)

Haut-Rhin Fire Brigade Department

INSA Strasbourg (Ecole d'Ingénieurs-Architectes)

Institut Universitaire de Technologie (IUT)

Languedoc-Roussillon Aménagement (LRA)

Le Nymphéa

Les Petit Debrouillards

Les Restaurants du Cœur

Le Sourire

Lycée des Métiers Bayard

Lycée d'Orion—EVRON

Lycée du Bâtiment Bouilloche

Lycée Duodha

Lycée Léonard de Vinci

Lycée Raoul Vadepié—EVRON

MEDEF (Employers Unions)

Montpellier Agglomération

Société d'Arboriculture de Guebwiller et Environs

Société Savante de l'Aéronautique et de l'Espace (A3F)

SOLOGNON

Syndicat Mixte des Industriels de la Vallée de la Lèze
(SMIVAL)

Syndicat Nationale des Fenêtres, Façades et Activités
Associées (SNFA)

UIMM (Metallurgy Unions)

Germany

Deutsche Umwelthilfe e.V.

Gesamtverband der Aluminiumindustrie (GDA)

IG Metall

Niedersachsen Metall (employers association)

Staatliches Gewerbeaufsichtsamt

Guinea

Association of Young Community Animators and Business Incubators (AJACIE)
Boke Institute of Mines and Geology
Boke Professional Training Center
Canadian Center for International Studies and Cooperation (CECI)
EngenderHealth
Environment Resources Management (ERM)
FHI360
Guinea Ecology
Guinean Association for Raising Awareness on Sustainable Development (AGEDD)
Jhpiego
International Foundation for Education and Self-Help (IFESH)
PACV (support program for village communities)
Recherche Triangle Institute (RTI) International
rePlan
Rural Commune Kamsar
Rural Electrification Office (BERD)
School-to-School International (STS)
Support Center for Economic and Social Development (CADES)
U.S. Centers for Disease Control and Prevention (CDC)

Hungary

A.A. Stádium Ltd
American Chamber of Commerce and Industry
Association of Hungarian Executives
Budapesti Technical and Economy University
Central-Transdanubian Directorate for Environment and Water
Confederation of Hungarian Employers and Industrialists
Corvinus University of Budapest
Federation of Technical and Scientific Societies—MTESZ
Fejér County Children's Home
Gaja Association for Environmental Protection
Hungarian Outsourcing and Shared Services Association
IAESTE (Magyar Mérnökhallgatók Egyesülete)
Joint Venture Association
Kodolányi János University of Applied Sciences
KÖVET Association for Sustainable Economies
Kutató Tanárok Országos Szövetsége
Miskolc University
Óbudai University Alba Regia Technical Faculty
Pannon University, Institutional Department of Environmental Engineering and Chemical Technology
Partners Hungary Foundation
Székesfehérvár Professional Forum for Environment
Woman in Science Society

Iceland

AFL—the Union of General and Special Workers in East Iceland
Confederation of Icelandic Employers
East Iceland Nature Research Centre
Federation of Icelandic Industries
Festa—CSR community
Fljotsdalsherad Land Reclamation Fund
Friends of Vatnajökull National Park
Iceland Chamber of Commerce
Landowners in Reydarfjörður
Landsnet
Landsvirkjun
The East Iceland Bridge for Development, Knowledge, Tourism, Culture and Innovation
The Icelandic Association of Aluminum Producers
Union of Icelandic Electrical Workers
University of Iceland
University of Reykjavík
The Vocational School of East Iceland
Worldwide Friends

Italy

Alzheimer Venezia Onlus
American Chamber of Commerce Italy
Amici della Terra
ANFFAS
Associazione Europea Operatori Polizia
Associazione Volontari del Fanciullo (Spinea)
Assomet-CentroAl (Italian Aluminium Association)
CFLI (Training and Logistics Consortium—Venice)
Circolo Giovanile Noi “Santa Maria Annunziata”
Comitato Gentori Ugo Foscolo
Comitato Santa Lucia Taru (CSLT)
Confindustria (Confederation of Industry Associations)
Corsortium for Aluminum Packaging Recycling (CIAL)
Green Cross (Marcon)
Group X (Salzano)
Istituto Breda di Milano
Istituto Italiano di saldatura (IIS)
La Cometa Onlus
Primary School ‘A. Gramsci’ (Spinea)
Primary School De Amicis (Dolo)
Primavera Social Cooperative
Red Cross—Spinea/Mirano
San Vincenzo (UNITALSI)
Società Italiana Metallurgia (AIM)
UNI (Ente Italiano di normazione)
Università di Padova
Università di Venezia
Università di Vicenza

Mexico

Asilo de Ancianos Divina Providencia
Index Ciudad Acuna (Asociación de Maquiladoras)
Cámara Nacional de la Industria y la Transformación
Canacintra (Canacintra)
Centro de Bachillerato Tecnológico Industrial y de
Servicios C.B.T.I.S #54
Centro del Desarrollo para el Potencial Humano (CDPH)
Club de Leones de Ciudad Acuña.
Club Rotario de Ciudad Acuña.
Colegio de Estudios Científicos y Tecnológicos del
Estado de Coahuila (CECYTEC).
Colegio Nacional de Educación Profesional Técnica
(CONALEP).
EsAFeVi AC.
Instituto Tecnológico y de Estudios Superiores de Monterrey
(ITESM).
Instituto Tecnológico Superiores de Ciudad Acuña (ITSA).
Pronatura A.C.
Reforestamos Mexico, A.C.
Unidos Somos Iguales, A.B.P.
Universidad Autónoma de Coahuila Campus Ciudad Acuña
(UAC).
Universidad de Monterrey (UEM).

Netherlands

Aluminium Centrum
Dutch Green Building Council
VAS (Dutch association for aluminum systems suppliers)
Vereniging Nederlandse Metallurgische Industrie
(VNMI—Dutch metals association)
Vereniging voor Natuur en Milieu Educatie—IVN
VMRG (Dutch association for metal window and
door suppliers)

Norway

American Chamber of Commerce Norway
Association for the Primary Aluminium Industry in the
Nordic Countries (AMS)
Conservation of Arctic Flora and Fauna (CAFF)
EnergiRike
Enova—Norwegian Energy Efficiency Agency
Forum for Environmental Technology
(Forum for miljøteknologi)
Friends of the Earth Norway (local and national)
Future in Our Hands (Fremtiden i våre hender)
Gassnova
Green Warriors of Norway
IndustriEL
Innovation Norway
Junior Achievement—Young Entrepreneurship Norway
(Ungt Entreprenørskap)

Nature and Youth (Natur og Ungdom)
NCE EYDE (National Center of Expertise)
NIKE
Node Eyde Women (NEW)
Norwegian Organization for Sea Rescue
Norwegian University of Science and Technology (NTNU)
Research Council of Norway
SFI Metal Production (Centre for Research Based Innovation)
SINTEF
Sørlandets Kompetansefond
Statnett
The Confederation of Norwegian Enterprises (NHO)
The Council for the Lister Region (Listerrådet)
The Federation of Norwegian Industries (Norsk Industri)
The Research Factory (Forskerfabrikken)
University of Agder
University of Nordland
ZERO Emissions Resource Organization

Russia

American Chamber of Commerce
Environmental Educational Center Zapovedniks (EcoCenter)
Forum of Donors
Fund for Social Development Time to Live (Samara)
Fund for Social and Environmental Rehabilitation of the
Samara Region
Fund for Sustainable Development
Institute of International Education
Moscow Institute of Steel and Alloys (MISiS)
Russia's Union of Industrialists and Entrepreneurs
Russian Carbon Fund (Moscow)
Samara Regional Chamber of Commerce
Samara State Aerospace University (SGAU)
The Foreign Investment Advisory Council
The Union of Employers of Samara Region
Union of Producers, Suppliers and Consumers of Aluminum
U.S.-Russia Business Council
Union of Russian Suppliers of Metal Products

Spain

American Chamber of Commerce
Asociación de Grandes Consumidores Industriales de
Energía (AEGE)
Asociación de Metales Ligeros (ATESMEL, Spain association
of light metals)
Asociación Española del Aluminio y Tratamientos de
Superficie (AEA)
Asociación para el Progreso de la Dirección (APD)
Federación Asturiana de Empresarios
Cámara de Comercio de Avilés
Cámara de Comercio de A Coruña
Club Español de la Energía

Colegio de Químicos de Galicia (Galician Association of Chemists)

Consellería de Economía e Industria of Galicia

Consellería de Educación y Ordenación Universitaria of Galicia

Economics for Energy

Federación de Asociaciones de Vecinos de Coruña

Fundación Asturiana de Energía (Asturias Foundation for Energy)

Fundación de Ayuda contra la Drogadicción (Foundation Against Drugs Addition)

Fundación Junior Achievement España (Junior Achievement Spain Foundation)

IESE Business School

IE Business School

Instituto Gallego de la Energía (INEGA)

Laboral Centro de Arte y Creación Industrial

Oficina Asturiana para el Cambio Climático (Asturias Office for the Climate Change)

Universidad de La Coruña (University of La Coruña)

Universidad de Oviedo (University of Oviedo)

Universidad de Santiago de Compostela

Universidad de Vigo (University of Vigo)

Switzerland

Ecole polytechnique fédérale de Lausanne (EPFL)

The European Organization for Nuclear Research (CERN)

University of Geneva

University St. Gallen

United Kingdom

ACAS

Audley Primary School

Breast Cancer Care

Business Class West Midlands

Centre for Window Cladding Technology (CWCT)

Council for Aluminium and Buildings (CAB)

DEBI

Devon Wildlife

EEF

EXIST

Force Cancer Charity

Guardian Angels Primary School

Heartlands Hospital Trust

Hospiscare

London School of Economics and Political Science

Paignton Zoo

Shropshire Chamber of Commerce

Solihull Conservation—Castle Bromwich Historical Gardens

Stem

St. Martin's Primary School

United States

Academy of Model Aeronautics

Adult Education Foundation of Blount County

ALPS Adult Day Care Center

Alzheimer's Awareness

American Association of University Women

American Cancer Society

American Cancer Society Relay for Life

American Forests

American Heart Association

American Red Cross

American Red Cross of Central Pennsylvania

American Society of Safety Engineers—Hudson River Valley Chapter

American Society of Quality—Hudson Valley Chapter

American Trucking Association

Aquarium of the Pacific

Arkadelphia Public Schools

Arthritis Foundation

ASSETS Lancaster

Association of Fundraising Professionals

Badin Lake Association

Baldwin Wallace College Scholars Program

Bellingham Public Schools

Bellingham Public Schools Foundation

Bellingham Technical College

Bellingham Technical College Foundation

Bellingham Whatcom Chamber of Commerce

Beyond the Bay

Black Professionals Association

Boys & Girls Club of Evansville

Boys & Girls Club of Massena

Boys & Girls Club of Morristown

Boys and Girls Clubs of the Tennessee Valley

Boys & Girls Club of Ulster County

Boys & Girls Club of Whatcom

Brescia University

Brigid Collins

Business Council of New York State

Calhoun County (TX) Independent School District

California State University Channel Islands

California Trucking Association

Camp del Corazon

Canacar Association

Canapat

Carver Community Center

Central Park Conservancy

Central Services of Hamblen County

Chandler Chamber of Commerce

Children's Home of Kingston

Children's Museum of Evansville

CHOC Foundation

CITEC, Inc.
 City Year
 Clarkson University
 Cleveland Clinic
 Cleveland Foundation
 Cleveland MetroParks
 Cleveland Metropolitan School District
 Cleveland Zoological Society
 Cleveland Kids in Need
 College Mentors for Kids
 College Now
 Commercial Vehicles Solutions Network
 Community Action Program of Lancaster County
 Community College of Baltimore County
 Conservance for Cuyahoga Valley National Park
 Council of Industry
 Cuyahoga Community College
 Cuyahoga River Restoration
 Cuyahoga Valley National Park
 De Leon Club of Victoria
 Diversity Distinguished Lecture Series—Southwest Indiana
 Domestic Violence & Sexual Assault Services
 Dorothy H. O'Connor Pet Adoption Center
 Douglas Cherokee Economic Authority
 Economic Development Coalition of Southwest Indiana
 El Segundo High School Career Readiness Program
 El Segundo School Board
 Encore Theatrical Company
 Esperanza
 Evansville Museum of Arts and Science
 Evansville Zoological Society
 Family of Woodstock
 Ferndale Chamber of Commerce
 Ferndale Community Service Cooperative
 (Ferndale Friendships Community Garden, Ferndale
 Holiday Giving Store)
 Ferndale Food Bank
 Ferndale School District
 Fern Elementary
 Food Bank of Coastal Georgia
 Food Bank of the Golden Crescent
 Food on Foot—Los Angeles
 Food on Foot—Morristown
 Francis Tuttle Technology Center
 Friends of Breakthrough Schools
 Friends of Great Smoky Mountains National Park
 Friends of Madrona Marsh
 Friends of Panther Creek State Park
 Friends of the Robert Moses State Park Nature Center
 Gila River Indian Community
 Girl Scouts of Southwestern Indiana
 Grades of Green
 Great Smoky Mountains Institute at Tremont
 Greater Cleveland Food Bank
 Greater Cleveland Partnership
 Greater Lafayette Chamber of Commerce
 Greater Massena Chamber of Commerce
 GreenVets
 Grow Southwest Indiana Workforce
 Gurdon Public Schools
 Habitat for Humanity of Blount County
 Habitat for Humanity of Evansville
 Hamblen County Board of Education
 Hamblen County Substance Abuse Coalition
 HC*Excell
 Heavy Duty Manufacturers Association
 Helen Ross McNabb Centers
 Henderson State University
 High Rock Lake Association
 Ijams Nature Center
 Ivy Technical Community College of Indiana
 Junior Achievement of Southwest Indiana
 Keep America Beautiful
 Keep Blount Beautiful
 Keep Morristown Beautiful
 Komen Breast Cancer Foundation
 Lafayette School Corporation
 Lancaster City Alliance
 Lancaster County Conservation District
 Lancaster County Medical Foundation
 Lancaster County Workforce Investment Board
 Lancaster Farmland Trust
 Lancaster General Hospital
 Little River Watershed Association
 Lummi Nation Department of Natural Resources
 Malone Child Safety Center
 Manheim Township Educational Foundation
 Manufacturing Advocacy and Growth Network
 Massena Central School District
 Massena Neighborhood Center
 Mercy Housing—Sterling Meadows
 MetroHealth
 Milagro House
 Millersville University of Pennsylvania
 Morristown Area Chamber of Commerce
 MyCom Youth Advocacy
 National Fish and Wildlife Foundation
 National Private Truck Council
 National Private Transport Association of Mexico
 National Truck Equipment Association
 National Truck Tanker Equipment Association
 National University/Sally Ride Science
 National Fish and Wildlife Foundation
 NatureBridge

North American Council for Freight Efficiency
 North Carolina Economic Development Partnership
 North Country Alliance
 North Country Regional Economic Development Council
 North Country STEM Learning Network
 Northwest Indian College
 Northwest Innovation Resource Center
 NTMA
 Octoraro Watershed Association
 Ohio and Erie Canalway Coalition
 Ohio Chamber of Commerce
 Operation Gratitude
 Peace in the Hood
 Pediatric Therapy Network
 Pellissippi State Community College
 People for Community Improvement
 Pennsylvania Family Support Alliance
 Port Lavaca Chamber of Commerce
 Power Packs – Hempfield Affiliate
 Purdue University
 Relay for Life of Hamblen County
 Resources for Sustainable Communities
 Resources for Sustainable Communities—North Sound
 Baykeepers
 Richard Williams Jr. Leadership Development Academy
 Ride Solution—Four Rivers Resource
 Rose Center Council for the Arts
 Rose-Hulman Institute of Technology
 Schreiber Pediatric Rehab Center of Lancaster County
 Shalom Partnership of Lancaster, Inc.
 Sharefest
 Society for Science and the Public
 Society of Automotive Engineers
 Socks for Souls
 South Texas Blood and Tissue Center
 Spanish American Civic Association
 SparkLA
 SPARK Museum of Electrical Invention
 spcaLA
 Special Olympics World Games
 St. Augustine Hunger Center
 St. Lawrence County Chamber of Commerce
 St. Martin de Porres High School
 St. Regis Mohawk Tribe Environment Division
 State University of New York College at Potsdam
 Susan G. Komen Foundation
 Susan G. Komen Race for the Cure
 Sustainable Connections
 Tabor Community Services, Inc.
 Technology & Maintenance Council
 Tennessee College of Applied Technology
 Tennessee Trucking Association
 Thaddeus Stevens Foundation/College of Technology
 Trading Ford Historical District Preservation Association
 The Arc of Evansville
 The Arts Council of Southwest Indiana
 The Heavy Duty Manufacturer Association
 The Nature Conservancy of Indiana
 The Nature Conservancy of Southwest Indiana
 The Recycling Partnership
 The S.P.A.R.K.S. Foundation
 tnAchieves
 Torrance Area Chamber of Commerce
 Torrance Memorial Medical Center
 Toys for Tots—Victoria
 Tree Musketeers
 Tricycle Learning Foundation
 Truck Trailer Manufacturers Association
 Tuskegee Airman—Los Angeles Chapter
 Ulster County Regional Chamber of Commerce Foundation, Inc.
 Ulster Green ARC
 Ulster Literacy Association
 United Disabilities Services
 United Way of Blount County
 United Way of Calhoun County
 United Way of Greater Cleveland
 United Way of Greater Knoxville
 United Way of Hamblen County
 United Way of Ulster County
 United Way of Victoria County
 University of Evansville
 University of Houston-Victoria
 University of Southern Indiana
 University of Tennessee
 University Settlement
 Uwharrie Point Community Association
 Victoria Business & Education Coalition
 Victoria College
 Victoria College Foundation
 Victoria Independent School District
 Vietnam Veterans of America, South Bay
 Volunteer Center, South Bay
 Walters State Community College
 Warrick County Museum
 Warrick County School Corp.
 Warrick County Soil and Water Conservation
 Warrick Wellness Pathways
 Welch Mountain Health Centers
 Western Reserve Land Conservancy
 Windsor Hills Math-Science-Aerospace Magnet School
 Yadkin Riverkeeper
 YMCA of Kingston and Ulster County
 YWCA Lancaster
 Youth First

Youth Resources
YWCA of Greater Cleveland

Community Consultative Groups

Australia

Alcoa Myara Mining Community Forum
Anglesea Heath Consultative Committee
Community Advisory Boards—Point Henry
Community Advisory Network—Portland
Community Consultative Networks—
Pinjarra, Wagerup, Anglesea, and Yennora
Dwellingup Community Compact
Environmental Improvement Plan Advisory Groups—
Kwinana and Pinjarra
Keysbrook Hills Community Group
Kwinana Communities and Industries Forum
Kwinana Long-term Residue Management Strategy
Stakeholder Reference Group
Macropod Management Plan Stakeholder Group
Pinjarra Long-term Residue Management Strategy
Reference Group
Point Danger Committee of Management
Port of Portland Environment Lead
The Far South West Koala Stakeholder Working Group
Traditional Owners of Howard and Elcho Islands in
East Arnhem Land

Brazil

Alumar Community Relations Advisory Board
Juruti Community Relations Advisory Board
Itapissuma External Advisory Board
Poços de Caldas Community Relations Regional Board
Tubarão Community Relations Advisory Board
Utinga Advisory Board

Canada

Community Advisory Boards
Baie-Comeau
Bécancour
Deschambault
Lethbridge
Regional Sustainable Development Committee
(Montréal)
Working Groups
Community Consultation Committee—Becancour
Industrial Park
Deschambault Quebec Farmer Union Committee
Exchange and Information Committee (Baie-Comeau
Anse du Moulin Remediation Project)
Alcoa Sustainable Communities Funds
Baie-Comeau
Bécancour
Deschambault

China

Bohai Community Advisory Board
Kunshan Community Advisory Board
AFS Suzhou Community Advisory Board

Mexico

Acuna Community Advisory Board

Norway

Lista Community Advisory Board
Mosjøen Community Advisory Board

United States

Citizens Panel
Point Comfort, Texas
Community Advisory Boards
Gum Springs, Arkansas
Fullerton, California
Newbury Park, California
Torrance, California
La Porte, Indiana
Lafayette, Indiana
Newburgh, Indiana (Warrick Operations)
Davenport, Iowa
Whitehall, Michigan
Kingston, New York
Massena, New York
New York, New York
Badin, North Carolina
Barberton, Ohio
Cleveland, Ohio
Alcoa/Knoxville, Tennessee
Morristown, Tennessee
Point Comfort, Texas
Wichita Falls, Texas
Hampton, Virginia
Ferndale, Washington
Wenatchee, Washington

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Verification Statement

Alcoa, Inc.
390 Park Avenue
New York, NY 10022

First Environment performed a verification of emissions sources contained in Alcoa, Inc.'s (Alcoa) 2015 GHG Inventory, as represented to First Environment in "April 16 Final 2015 Alcoa GHG Emissions Inventory.xlsx" and Alcoa's total energy consumption as represented to First Environment in "Overall Energy Usage Data_2015_First Environment.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 Control
Geographic Boundaries	Global
Operational Boundaries	Scope 1 and Scope 2 emissions
Reporting Period	EY2015
Included Greenhouse Gases	CO ₂ , CH ₄ , N ₂ O, PFCs, and SF ₆
Included Metrics	Total reported energy consumption
Reported Emissions	34,878,991 tCO ₂ e
Reported Energy Consumption	443,102,384 GJ

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 2015. Based on this statement, Alcoa is seeking a confirmation that the 2015 GHG Inventory is in conformance with the specified criteria and accurate relative to a specified materiality threshold 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 and Procedures, Alcoa's 2015 Energy Consumption and Greenhouse Gas Emissions, Version 5
- 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

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 reported emissions of greater than five percent.
- A material misstatement is a discrepancy in total reported energy consumption of greater than five percent.

Verification Statement

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 with Alcoa staff responsible for inventory data and a site visit at the Alcoa's corporate offices from which the centralized inventory management system is administered also informed First Environment's emissions assessments. 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.

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 2015 GHG inventory "April 16 Final 2015 Alcoa GHG Emissions Inventory.xlsx" and Alcoa's total energy consumption as represented to First Environment in "Overall Energy Usage Data_2015_First Environment.xlsx." are not materially correct.

This verification statement is provided on the Nineteenth of April, Two-thousand and sixteen.

First Environment, Inc.
91 Fulton Street
Boonton, New Jersey 07005
www.firstenvironment.com
1-800-486-5869



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

Michael M. Carim, Lead Verifier

A handwritten signature in blue ink, appearing to read "B. Tod Delaney".

B. Tod Delaney, Independent Internal Reviewer

Verification Statement

Alcoa, Inc.
390 Park Avenue
New York, NY 10022

First Environment performed a verification of emissions sources contained in Alcoa, Inc.'s (Alcoa) 2015 Scope 3 GHG emissions assertion, as represented to First Environment in "Scope 3 Summary_2015 Emissions_Final v6.xlsx." The GHG assertion was prepared by representatives of Alcoa and submitted to First Environment for assessment. The scope of the GHG assertion is as shown in Table 1:

Table 1: Alcoa's GHG Assertion Scope

Reporting Period	2015 calendar year
Included Greenhouse Gases	CO ₂ , CH ₄ , N ₂ O

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

Table 2: Alcoa's GHG Assertion Details

Emissions Category	Included Scope 3 Emission Sources	Reported Emissions (MTCO_{2e})
Category 1: Purchased Goods and Services	Goods in Global Primary Products purchased in excess of 40,000 MT	2,986,051
Category 3: Fuel and Energy Related Activities	Includes purchased fuels for all Alcoa business units that are available in the Alcoa Greenhouse Gas Information System and the Global Energy System database. Excludes upstream emissions from electricity generation.	2,430,709
Category 5: Waste Generated in Operations	GRP and EPS locations in the Waste Management Sustainability Services program for 2015 analysis	5,579
Category 6: Business Travel	Business travel for Alcoa employee travel in the US	12,182
Category 7: Employee Commuting	North American employees based on average US National Transportation data.	84,814
Category 9: Downstream transportation and distribution	Truck and rail transportation for US GRP locations	119,944

Verification Objectives

The primary objective of the verification process is to provide Alcoa with an independent opinion of veracity of the GHG data presented in its Scope 3 GHG assertion for the emission year 2015. Based on this statement, Alcoa is seeking a confirmation that its 2015 Scope 3 emissions assertion is in conformance with the specified criteria and accurate relative to a specified materiality threshold for the purposes of assuring internal confidence for voluntary public reporting.

Reporting and Verification Criteria

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

- Basis of Preparation and Procedures, Alcoa's 2015 Energy Consumption and Greenhouse Gas Emissions, Version 5

Verification Statement

As informed by:

- 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 greater than ten percent in any Scope 3 emissions category.

Verification Methods

The verification process consisted of a strategic review of the entire GHG assertion, followed by review of a risk-based sample of historical evidence of source emissions estimates. Interviews with Alcoa staff responsible for the administration of centralized data management systems during a site visit at Alcoa's corporate headquarters 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 in each Scope 3 category. First Environment's estimates were compared against Alcoa's total reported emissions considering both conformance to the requirements of the criteria, as well as the overall accuracy, of the GHG assertion in each emissions category.

Level of Assurance and Qualifications

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 Scope 3 GHG emissions assertion. First Environment confirms that we are not aware of any issue that could impair our objectivity in relation to this verification engagement.

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 2015 Scope 3 GHG emissions assertion as represented to First Environment in "Scope 3 Summary_2015 Emissions_Final v6.xlsx" are not materially correct.

This verification statement is provided on the Tenth of May, Two-thousand and sixteen.

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1-800-486-5869



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

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