Google

Responsible Supply Chain Report

2019

Responsible Supply Chain Report 2019

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Supplier responsibility at Google

Google is a company built on ingenuity and innovation—not just in our products and technology but in the way we create those products and how we work. Our passion for finding new and better ways of doing things propels us forward and inspires us to take a closer look at the interconnected pieces and processes throughout our supply chain. To dig deep. To uncover the broader impacts and ripple effects of every action we take. Each year, we look forward to sharing our insights and experiences on this journey in our Responsible Supply Chain Report.

In 2018, we set a goal to help our suppliers transition to renewable energy. We also strengthened our commitment to develop markets that will enable access to affordable renewable energy in the communities where we source and produce our products. We're excited to share progress on a few projects aimed at increasing renewable energy access, both in key manufacturing regions and further upstream in mining communities.

Throughout this report, you'll see these and other examples of our progress with conflict minerals, materials traceability, renewable energy, and recycled materials use, among other areas. You'll meet some of the vendors that share our commitments toward community, discover how we're partnering with other like-minded organizations, and learn how we're taking a comprehensive view of our entire supply chain to better serve the individuals, communities, and environments it touches. You'll also get insight into our current projects—and a glimpse at what the future holds.

Ultimately, we hope to do more than just improve our supply chain. We hope to challenge and inspire our industry to do the same. Success will rely on collaboration, and we're always looking for others to join us on this journey.

Karl Braitberg
Vice President, Supply Chain
Technical Infrastructure

Ana Corrales
Chief Operating Officer
Devices and Services

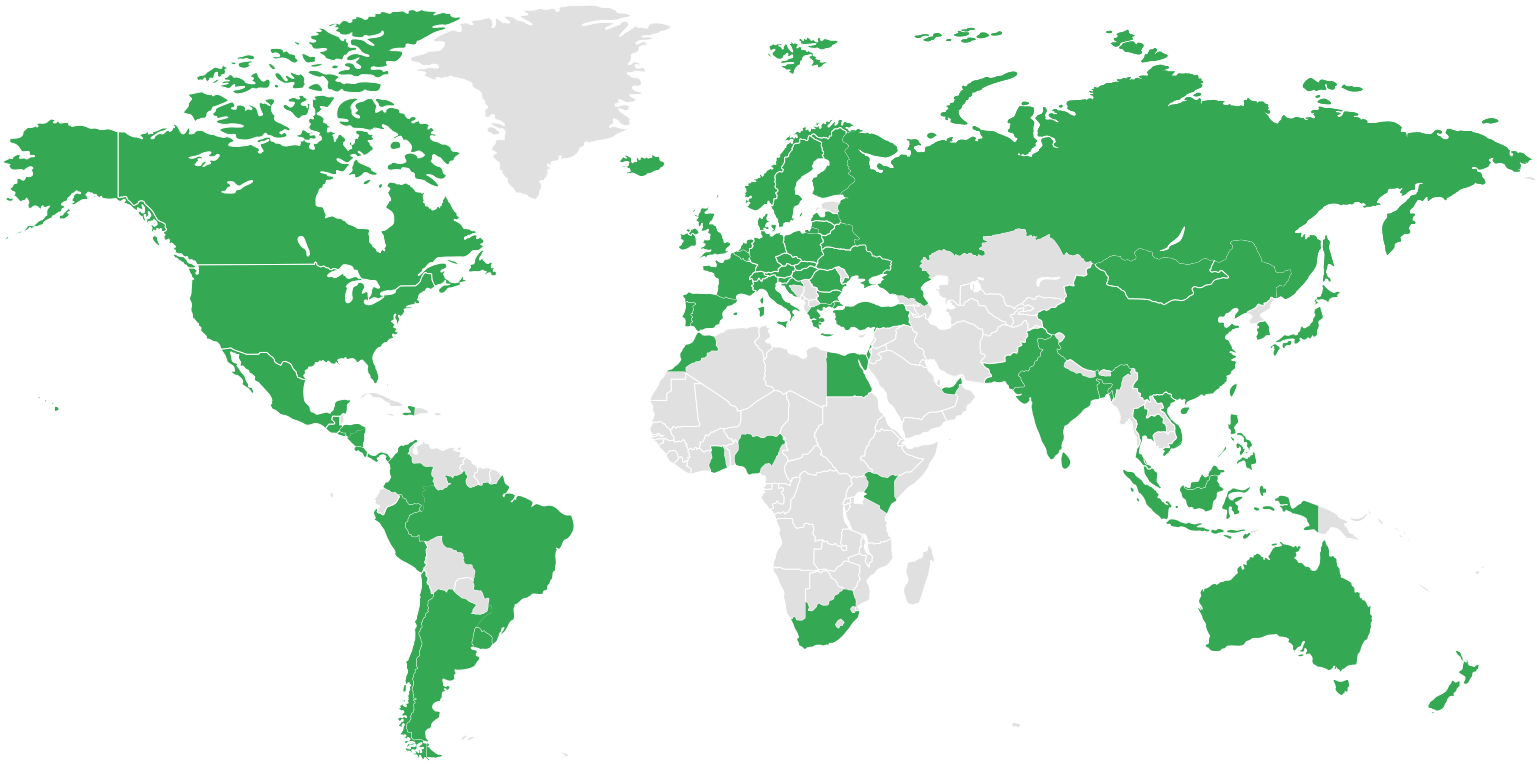
About our suppliers

We work with more than 1,000 suppliers worldwide that support our business and operations, including hardware manufacturing and indirect services. Google's core products—Android, Chrome, Gmail, Google Drive, Google Maps, Google Play, Search, and YouTube—each have more than 1 billion monthly active users. Our consumer devices include products such as Google Pixel, Google Home, Chromecast, Google Wifi, Google Pixelbook, Google Nest Learning Thermostat, and Google Nest Hub. The hardware in our data centers helps power a broad collection of cloud-based products and services, including G Suite business productivity apps like Docs, Drive, and Calendar and satellite mapping and analysis platforms like Google Earth and Google Earth Engine.

We work with more than

1,000

active suppliers in over 70 countries.



About this report

Google formally launched our Responsible Supply Chain (RSC) program in 2012. In 2017, we published our first RSC Report, which outlined our framework, tools, and key performance metrics. In 2018, we showcased several key projects across our supplier network that helped illustrate many of our program's successes, challenges, and aspirations. This year, we're spotlighting new initiatives while explaining our vision for supply chain responsibility in more detail.

The annual social and environmental performance data in this report covers our 2018 fiscal year (January 1 through December 31, 2018). The spotlights may also include data and stories from prior years to provide context, as well as some of our progress in 2019. Unless otherwise specified, all performance data included in this report applies to Google LLC. The primary exceptions include our greenhouse gas (GHG) emissions, energy use data, and Conflict Minerals program, which cover the combined operations of Google and our Other Bets.

For more information about our supplier responsibility program, including case studies, white papers, and blogs, please see our Responsible Supply Chain website.

Our approach

Our vision

We aspire to create a supply chain model for the future that accomplishes the following:

- **Includes everyone.** We want to collaborate with suppliers and peers across industries and service sectors to create a safer, fairer, and more equitable supply chain.
- **Makes things better.** We want to leave every supplier workplace, community, and ecosystem we touch better than we found it.
- **Transforms with technology.** We want to invest in and build technologies to create the world's most trusted supply chain network.

Our journey: The ripple effects of change in our supply base

The stakes are high for supplier responsibility and for each of us. The global challenge of climate change, biodiversity loss, air and water pollution, and the rapid depletion of natural resources is taxing the planet's health. Community and human health are also at risk as threats such as poverty, food instability, and climate displacement grow in severity.

These challenges are complex and interconnected; changes in one area can have a ripple effect on others. In response to challenges like these, we seek to be highly strategic in how we apply ideas and innovations. Every decision we make creates a series of chain reactions that can affect people, communities, and ecosystems in myriad ways. At every stage, we seek to understand the connected impacts of our supply chain and collaborate internally and externally to be more inclusive and restorative across all areas of our work.

This work requires collaboration with partners to determine where we have the most potential for influence and where we can make the biggest impact. It also requires ongoing transparency, dialogue, and accountability from everyone in our supply chain, along with a willingness to adjust our strategies and continually iterate to improve as we learn.

We work across industries to set expectations for ourselves and our suppliers on both social and environmental performance. By investing in areas like worker engagement, renewable energy, transparency in the mineral supply chain, and materials reuse, we're working to create stronger and more resilient communities. And, by partnering with nongovernmental organizations (NGOs), industry groups, peers, and suppliers, we'll continue our efforts to have a more positive impact on our suppliers and their communities.

Our priorities

Our supply chain spans seven priority areas, which we've organized into three categories: putting people first, strengthening communities, and protecting the planet.

Putting people first

We're committed to a fair and inclusive supply chain that creates shared value everywhere we operate.

- Treating workers fairly
- Creating safe and healthy workplaces
- Operating ethically

Strengthening communities

We aspire to strengthen communities everywhere we do business. This includes sourcing minerals responsibly and empowering residents in mining communities to pursue outside economic opportunities.

- Sourcing minerals responsibly
- Increasing community resilience

Protecting the planet

We're working to build an energy-efficient, low-carbon supply chain that makes smart use of the earth's resources, protects ecosystems, and helps lead the fight against climate change.

- Addressing climate change
- Working to end our reliance on raw materials

These areas are interwoven and mutually reinforcing. For example, treating workers with dignity and respect creates stronger, more empowered communities. Investing in infrastructure in supplier communities creates more social and economic opportunity and helps reduce reliance on extractive industries like mining. Replacing dirty energy sources with renewable options contributes to a reduction in GHG emissions and increases community and global well-being.

How we make this happen

Our program strategy is built on four major pillars that help mitigate risk and promote better results across our supply chain.

1. **Supplier Code of Conduct.** Our Supplier Code of Conduct sets expectations designed to protect the health, safety, and treatment of workers, which includes the prohibition of any form of modern slavery, including forced, bonded (including debt bondage), or indentured labor; involuntary prison labor; sex trafficking; and slavery or trafficking of people. Our Supplier Code of Conduct is included in our supplier contract templates, and suppliers are expected to actively drive adherence to the Code.

2. **Supplier engagement.** Through mechanisms such as supplier self-assessments, risk assessments, and third-party on-site audits, we gauge how suppliers are performing relative to our standards, identify potential risks, and address concerns. We also work closely with manufacturing suppliers to build capabilities in areas like improving environmental performance, protecting workers from hazardous manufacturing process chemicals, and increasing transparency in the mineral supply chain.

3. **Community investment.** When we work with our suppliers, we aspire to positively impact not just the areas in which we work together but also our suppliers' overall operations and their broader communities. For example, as part of our goal to end our reliance on raw material extraction, we're working with mining communities to end their reliance on the mining trade.

4. **Partnerships.** We partner with NGOs, industry groups, suppliers, and peers to tackle issues bigger than a single company can address alone. Our partners bring a wide range of expertise and creative thinking to issues like improving worker well-being, advancing impact sourcing, increasing transparency in minerals mining, reducing reliance on raw materials, bringing electricity to mining communities, and expanding renewable energy markets.

2018 highlights

Putting people first

62

We performed on-site assessments at 62 supplier sites in seven countries for a cumulative total of 236 site assessments since 2013.

2,800

We engaged more than 2,800 workers through third-party worker surveys and interviews, giving us important insights into worker priorities.

158

158 of our suppliers participated in our Manufacturing Restricted Substances List self-assessment process, initiating the transition to safer and greener alternatives.

Strengthening communities

100%

Of the smelters or refiners we used for conflict minerals (tantalum, tin, tungsten, and gold), 100% were Compliant.[1]

4

We launched four renewable energy projects in the Democratic Republic of the Congo to help provide additional economic options.

Protecting the planet

170

Our assessments at 10 supplier sites identified more than 170 potential energy-efficiency measures and over $13 million per year in potential energy savings.

93%

Of the suppliers participating in our environmental surveys, 93% responded to our climate change survey requests.

71%

Of the suppliers surveyed, 71% reported integration of climate risk into their long-term business objectives.

40%

We decreased Google's consumer device transportation carbon emissions per unit by 40% by moving transportation to non-air shipping where possible.

Putting people first

Overview

We're committed to building a truly inclusive supply chain. In practice, this means honoring and respecting everyone who engages with the Google supply chain. Our baseline is ensuring that Google treats workers with dignity and respect, maintains safe and healthy workplaces, and holds suppliers to high ethical standards. But our long-term goal is to unlock the power of partnerships and to change the dynamic between companies, suppliers, and users so that together we can create a safer, fairer, and more equitable supply chain.

Treating workers fairly

We believe every person working in our supply chain should be treated fairly and with dignity and respect. We accomplish this by deploying policies and processes throughout our supply chain that are designed to protect the people who make our products and provide valuable services to our company.

The foundation of this work is our Supplier Code of Conduct, which includes our expectations for labor and human rights, health and safety, environmental responsibility, and ethics and compliance. Laborwise, we expect all suppliers in our operations and supply chain—and their suppliers—

to ensure that employment is freely chosen, which includes zero recruitment fees paid by workers. Our suppliers must also prohibit the use of child labor, guard against sexual harassment and verbal abuse, prevent discrimination, and support freedom of association and collective bargaining rights.

We hold suppliers accountable to our Supplier Code of Conduct through a multi-step assessment process, which includes self-assessments, risk assessments, and independent third-party audits. See page 36 for our audit performance in this area.

Engaging workers

Through our site assessment process, we can detect areas of non-conformance on-site. One important component of our audits and broader supplier engagement is hearing directly from the employees working for our suppliers, as they often provide some of the most valuable insights into what's working and what needs to improve. To hear from workers, we engage with third parties to gather feedback through anonymous worker surveys and face-to-face interviews. Workers are invited to share their concerns and satisfaction in areas such as working conditions, health and safety, wages and benefits, working hours, and communication with management. This information influences our strategies, while also giving suppliers valuable insights into how to improve worker recruitment and retention.

In 2018, surveyed workers' top priorities included accessing new career advancement and development opportunities in addition to receiving higher wages and bonuses. In response, we brainstormed with supplier management on paths for employee growth and development and shared best practices we've learned from other suppliers.

Over 1,750 supply chain workers were interviewed through our third-party audit process and more than 1,000 participated in our worker surveys in 2018.

Creating safe and healthy workplaces

We're committed to ensuring that everyone who makes our products or provides services to us works in a healthy and safe environment. In accordance with our Supplier Code of Conduct, our suppliers are expected to maintain safe and healthy workplaces that comply with all applicable laws and to implement OHSAS 18001/ISO 45001 or an equivalent management system to identify and resolve related issues.

Suppliers' health and safety management systems must identify, evaluate, and control worker exposure to safety and health hazards—including chemical, biological, physical, and ergonomic stressors—and provide proper design, controls, procedures, and guidance in factory production and other work environments. We also expect suppliers to identify and plan for potential emergencies and provide workers with ready access to clean toilet facilities; potable water; and sanitary food preparation, storage, and eating facilities. If applicable, housing facilities must be clean, safe, and fair and include adequate personal space and hot water for bathing and showering.

Driving healthier manufacturing processes

To protect workers' health, we've embarked on a long-term initiative to eliminate harmful substances from our manufacturing process by giving our suppliers the knowledge and support they need to transition to safer alternatives.

In 2017, we began incorporating substances from our Manufacturing Restricted Substances List (MRSL) into our manufacturing specifications for consumer hardware. We rolled out a comprehensive training program in 2018 to further support this initiative, which included webinars, workshops, in-person trainings at supplier factories, and e-learning courses in English and Chinese.

One encouraging achievement was replacing N-Methylpyrrolidone (NMP), a commonly used solvent in the electronics industry, with a safer alternative. NMP is a reproductive toxin that poses skin, eye, and respiratory hazards to workers. In 2018, we helped a supplier transition from a process that required submerging Google-printed circuit boards into a 250-gallon tank with a corrosive mixture that contained NMP to an alternative process that involves ionizing three nontoxic gases—nitrogen, oxygen, and tetrafluoromethane (refrigerant R14)—in an enclosed chamber. In addition to reducing health impacts to workers, the new process also generates less waste by eliminating the disposal of spent NMP liquid, which must be replaced quarterly.

Nearly 160 suppliers participated in our MRSL self-assessment process in 2018. We conducted follow-up investigations with 90% of the suppliers that reported using restricted chemicals in these assessments. The goals of our investigations are to ensure that chemical management practices are in place to protect workers and to continue to influence the choice of safer and greener alternatives at the design stage.

To date, through this collaborative effort to drive healthier manufacturing processes, suppliers have replaced nine unique products containing restricted substances—including NMP, toluene, methylene chloride, and hexane—with safer alternatives or completely eliminated them by innovating to newer processes.

Operating ethically

We expect our suppliers to uphold high ethical standards, including not engaging—either directly or indirectly—in corruption, bribery, extortion, embezzlement, or other illegal practices. To meet these standards, we encourage companies to disclose information about their business activities, financial situations, and performance in line with regulations and industry practices. We also expect our suppliers to protect Google's intellectual property and information privacy from attacks by third parties in the supply chain.

Addressing ethical conduct and the prevention of modern slavery

The United Nations estimated in 2018 that more than 40 million people were held in slavery globally, with over 70% of them women and girls.[2] Forced labor, indentured labor, debt bondage, and other forms of modern slavery can occur in industries with many workers and few regulations.

We have zero tolerance for any form of modern slavery in our supply chain. As codified in our supplier contracts, Google suppliers are required to comply with laws against international human trafficking, forced labor, and modern slavery. We reserve the right to audit any facility where modern slavery is reported and to terminate our agreements for any violation of these policies.

In addition to working with our suppliers to eliminate modern slavery, employees who manage relationships with higher-risk suppliers receive supplemental in-person training. We also have an online training course that includes anti-modern slavery education for workers in roles related to hardware supplier management. This training helps workers identify modern slavery red flags, shares anti-modern slavery best practices, and instructs workers to report modern slavery concerns. In 2018, over 300 Google employees managing relationships with higher-risk suppliers completed the online training.

We also continued strengthening our commitment to supply chain integrity by updating and publicly posting our Policy Against Modern Slavery. The policy defines modern slavery, gives a concrete list of prohibited actions, and provides channels for reporting suspected instances.

Read our 2018 Modern Slavery Statement.

Supplier assessments

We follow a multi-step process for evaluating our suppliers. Performing regular assessments helps us address potential issues early on and support our suppliers in taking corrective actions.

Self-assessments

We ask new suppliers that we assess as higher risk to complete a detailed self-assessment. The company's responses help us see how closely it adheres to our Supplier Code of Conduct. Many suppliers already have strong programs to address our requirements. When a self-assessment indicates that a supplier does not meet our expectations, we follow up to ensure it develops programs to address our concerns.

Risk assessments

Along with having suppliers evaluate their operations, we perform our own due diligence to understand current and potential risks in our supply chain. Our extensive Supplier Risk Assessment process evaluates the social, environmental, and ethical risks of working with individual suppliers or groups of suppliers. The results give our supplier managers insights to make better-informed sourcing decisions and to proactively manage their supplier relationships.

When performing a Supplier Risk Assessment, we look at a variety of factors, such as:

- **Country-level risks.** Are certain countries at higher risk for water scarcity, corruption, or child labor?
- **Product-specific risks.** Do suppliers use chemically intensive manufacturing processes? How physically demanding is the work involved?
- **Supplier fines or convictions.** Has the supplier been previously fined for human rights, environmental, or corruption violations?
- **Google's supplier-engagement efforts.** Has the supplier submitted a self-assessment? If problems were found during an audit, has the supplier taken steps to resolve them?
- **Supplier relationship.** How strategic is the supplier to our business? Do we have influence over the design of the product or the selection of the components?

2018 audit overview[3]

62

Supplier site assessments

525

Non-conformance issues identified

On-site assessments

We regularly perform independent third-party audits at our suppliers' facilities to determine whether the supplier is meeting our standards, to hear directly from workers, and to identify and help resolve issues. Our audits also provide valuable opportunities to raise suppliers' awareness of their social and environmental responsibilities, promote accountability, and encourage greater transparency.

The audits include in-depth factory, facility, and dormitory tours; management meetings; on-site worker interviews; and reviews of documents and records. Our audit program prioritizes our contract manufacturers, original equipment manufacturers, and suppliers initially identified as high risk. We performed 236 on-site assessments from 2013 to 2018.

Audit performance

Working hours and health and safety continue to be important focus areas across our industry. Here's a look at our most common non-conformance findings this past year and since the launch of our RSC program. We continue to add new hardware suppliers each year, accounting for the majority of our new non-conformance findings year over year.

When we find that a supplier is not conforming to our expectations, we expect the supplier to provide a corrective action plan (CAP) that outlines the root cause of the finding, how and when that company will resolve the issue, and what steps will be taken to prevent recurrence. We determine whether the plan is acceptable based on the severity of the non-conformance in addition to the effort and time required to resolve the issue.

We expect suppliers to demonstrate improvements in order to continue working with us. Our goal is to resolve the most severe issues immediately. We expect all other findings to be resolved in accordance with our guidelines as quickly as is practical. While we work with our suppliers to help them address findings, in certain cases we may decide to no longer pursue a relationship or to terminate our current relationship with a supplier.

Once a CAP is approved, the supplier is expected to provide evidence of resolution and to commit to improving over time, which may require follow-up verification. When the supplier can demonstrate that it has successfully implemented the approved CAP, we change the plan's status to "closed."

Most common non-conformance findings in 2018

Non-conformance category and criteria	Percentage
Labor	
Working hours Excessive hours (over 60 per week) or more than six consecutive workdays without rest	21%
Wages and benefits Workers not receiving or delayed in receiving legally required wages and benefits	9%
Health & Safety	
Emergency preparedness Fire code violations, inadequate drills, or inadequate fire alarm systems	18%
Occupational safety Improper controls for potential safety hazards; no up-to-date permits or certifications	7%
Environment	
Hazardous substances Ineffective work practices (such as labeling, handling, storage, and disposal) for managing hazardous substances	6%

Audit findings by category

	2013	2014	2015	2016	2017	2018	Cumulative
Audits completed	19	18	59	34	44	62	236
Labor	30%	28%	34%	33%	38%	38%	34%
Health & Safety	34%	40%	34%	34%	43%	35%	37%
Environment	13%	13%	13%	13%	10%	13%	12%
Ethics	6%	4%	5%	8%	2%	5%	5%
Management System	17%	15%	14%	12%	7%	9%	12%

Strengthening communities

Idjwi Island, in the Democratic Republic of the Congo, is one of the pilot locations for the Congo Power program.

Overview

We aspire to create stronger, more resilient communities everywhere we do business. We're taking action on more responsible sourcing of raw materials, including making broad, multi-industry commitments to ensure that conflict minerals are mined responsibly. We're also working on strategies to responsibly transition into and out of supplier communities, including investing in local infrastructure and vital services so that people have access to economic opportunities in addition to mining and manufacturing. As we work to end our reliance on raw materials altogether, these investments may prove critical to helping these communities persist and adapt in the face of change. At a minimum, our supply chain should do no harm. We aspire to leave communities better than we found them.

Sourcing minerals responsibly

We take proactive measures to manage the social and environmental impacts associated with the sourcing and extraction of raw materials for our consumer devices and data center equipment. This includes sourcing minerals for our electronics—specifically tin, tantalum, tungsten, and gold—exclusively from mines that aren't financing armed conflict in the Democratic Republic of the Congo (DRC) and other high-risk locations.

We launched our Conflict Minerals program in 2012 to improve transparency and develop conflict-free sources of these materials. From the beginning, our strategy has been to work collaboratively with governmental organizations and NGOs across the electronics industry and others to enable conflict-free sourcing for everyone. We're one of nearly 400 members of the Responsible Minerals Initiative, which provides independent third-party audits to ensure that smelters and refiners meet current conflict-free standards.

As of 2018, 100% of the smelters or refiners we use are conformant, active,[4] or verified by a third party to source from countries other than those covered in the 2010 Dodd-Frank Act (collectively referred to as "Compliant" smelters or refiners for the purposes of this report).

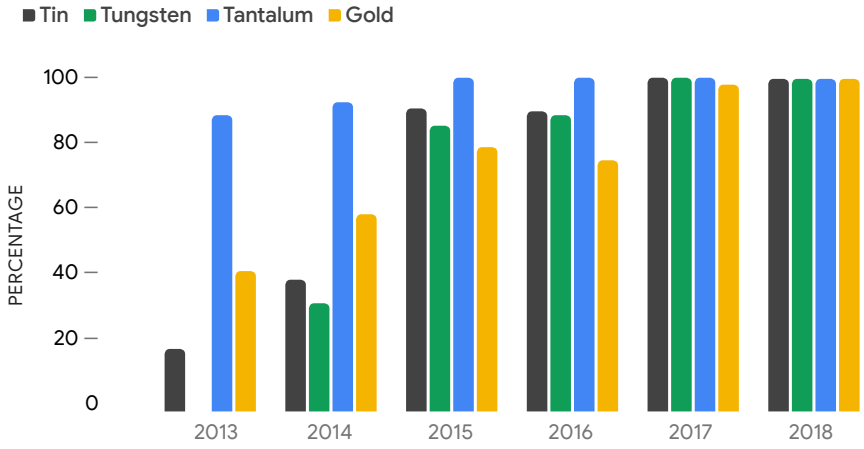
We're committed to eliminating child labor everywhere in our supply chain, and this includes in mining. In addition to our focus on tin, tantalum, tungsten, and gold, we also work with peer companies and partners to eliminate child labor in cobalt mining and strengthen cobalt tracing. In 2018, we completed a multi-year project with Pact that improved the capacity of child protection service providers and NGOs. We're working with our suppliers, other companies, and industry groups to ensure that all cobalt mines are conformant with zero child labor.[5]

As of 2018,

100%

of the smelters or refiners we use are Compliant.[6]

Compliant smelters or refiners, by metal (2013–2018)



SPOTLIGHT

Supply chain meets blockchain for end-to-end minerals tracking

Like most mined minerals, tin historically has been challenging to track as it travels from its original source all the way to the end consumer. Centered in Peru, our blockchain pilot is intended to make tin traceability easy, error-proof, secure, and collaborative so that everyone in the supply chain benefits.

Read about our pilot to increase transparency in global supply chains

Empowering minerals transparency

To continue to build visibility into the source of every mineral used in the electronics industry, we invest in ways to make the minerals-tracking process more transparent for everyone along the supply chain. In 2018, we joined several corporate partners along with Peruvian mining company Minsur and Berlin-based startup Minespider to launch an initiative for end-to-end minerals traceability.

Together, we're piloting a blockchain protocol—a decentralized, secure digital ledger—that tracks minerals at every touchpoint, from the mine all the way to consumers. Verifiable and tamper-evident, the technology helps guarantee the authenticity of mining sources for end users like Google while streamlining the compliance process for mining companies.

The first phase of the pilot is focused on Minsur's tin mine in San Rafael, Peru. If the pilot proves successful, we hope to see blockchain and other minerals-tracking technologies applied to large and artisanal mines around the world. Ultimately, we're building toward an open collaboration model that any industry player can join, inspiring greater traceability across the mining and minerals industry.

SPOTLIGHT

From pilot to power: Gathering renewable energy momentum in the Congo

In 2018, we began laying the groundwork for renewable energy in the DRC. Today, three Congo Power projects are operational and two more are on the way, each offering unique social and economic benefits to the community.

Learn about our progress installing solar systems in Congolese communities

Increasing community resilience

Roughly 40 million people work in artisanal and small-scale mining,[7] and many have few options outside the minerals trade. As a result, our decisions on whether to source materials from specific mines or to pull out of a mining community can have enormous consequences for local families. As we begin to understand these consequences more fully, we're launching investment initiatives in select communities to enhance local infrastructure and empower people to pursue alternative livelihoods.

In collaboration with nonprofit, academic, technical, and community partners, our initial investments have focused on solar energy projects in the DRC, where only 9% of the nation has access to electricity.[8] The projects vary in scale—from handheld solar lanterns to custom-engineered microgrids—depending on the community's most immediate needs.

For example, on Idjwi Island, we're developing a minigrid intended to power local production of ice and coffee and support poultry farming. In the Walikale territory of North Kivu, we're installing a system that will provide solar power and clean water to the community. Together, the projects have the potential to increase community health, improve educational outcomes, and introduce new microenterprise opportunities for local residents. In expanding access to diverse livelihoods, we want to improve the resilience of local communities and create better outcomes for everyone. We also want to support the communities that are committed to responsible sourcing.

Our community investment efforts, like our Congo Power initiatives, are still in their early stages. As we expand our program, we're looking at other ways to improve social and economic opportunity in supplier communities.

Technicians work to install an off-grid box system in Mubi as part of the Congo Power program.

Protecting the planet

Overview

We're committed to building an energy-efficient, low-carbon supply chain that makes smart use of the earth's resources, protects ecosystems, and helps lead the fight against climate change. This starts with areas where we can make an immediate impact, such as helping our suppliers adopt high-quality energy-efficiency measures and improve their environmental performance. In the long run, we want to build the principles of inclusivity, climate resilience, water stewardship, and circular design into our supply chain. We believe these principles can play a key role not just in reducing environmental impact but also in protecting human rights and community health.

Addressing climate change

Climate risks such as floods or extreme temperatures can threaten the availability of raw materials for suppliers, disrupt operations, and damage community health. To help our suppliers reduce GHG emissions and build toward a renewable energy future, we're incorporating climate-resilience strategies across our supplier network.

Going big on renewables

As a global leader in renewable energy purchasing, Google has long been a vocal advocate of greening grids worldwide. Our ultimate goal is to create a world where everyone has access to renewable energy; this includes Google, our suppliers, and their communities.

Last year, we announced our plan to develop an open-source collaborative platform to help address climate change by making renewable energy more affordable and accessible in markets where manufacturing occurs. In the months following the announcement, we launched an extensive fact-finding mission to learn the current state of renewable energy procurement in key supply chain markets and identify barriers and gaps. We then shared our findings across the industry and started mobilizing a network of peers and suppliers to address them.

The high cost of renewables is the most persistent barrier in markets outside the United States and Europe. In addition, many energy markets have few mechanisms—or none at all—through which companies can purchase renewable energy.

Our first major initiative will be to use our collective motivation to push the boundaries for renewable energy in a key manufacturing market. Partners in our open-source collaborative platform plan to work strategically to drive down the cost of renewable energy, making it accessible to more suppliers and companies. Our goal is to make it such a cost-effective option that suppliers no longer have to choose among what's best for their businesses, the environment, or the communities in which they operate.

Our work in increasing supplier access to renewable energy is intentionally inclusive. We aim for our investments in renewable energy and energy efficiency to drive better manufacturing across Google's supply chain and the industry and—importantly—to reduce the environmental impact of manufacturing for people and communities around the world.

Maximizing potential energy savings

We work closely with suppliers to improve their environmental performance by helping them get more out of every watt of energy they consume. This includes performing energy-efficiency evaluations at supplier sites, making recommendations for energy-efficiency measures, following up on implementation, and encouraging the adoption of robust energy-management systems.

In 2018, we identified more than 170 potential energy-efficiency measures, more than $13 million in annual savings potential, and over 16 megawatts of on-site solar photovoltaic (PV) potential across 10 supplier sites. In the coming months, our teams will work directly with suppliers to implement the measures with the greatest potential for payback and assist in the transition to renewable energy on-site. Energy-efficiency measures with the most savings potential include replacing high-density lighting with LED lighting, optimizing and automating chilled water distribution systems, replacing outdated chillers and other major equipment, and implementing fully integrated building management systems.

Our energy-efficiency assessments also have an impact beyond Google's supply chain. In fact, in many cases, the recommendations we make to suppliers should benefit all the customers they serve. We also encourage our suppliers to share best practices with other facilities owned by the same company. As with renewable energy, these long-term initiatives are intended to reduce GHG emissions across the sector and ultimately benefit the communities where our suppliers operate.

Google's 2018 GHG emissions: 15,027,224 metric tons of carbon dioxide equivalent (tCO_2e)*,†

Scope 1 Scope 2 Scope 3

TOTAL: 63,521 tCO_2e

TOTAL: 684,236 tCO_2e (MARKET-BASED)

TOTAL: 4,344,686 tCO_2e (LOCATION-BASED)

TOTAL: 14,279,467 tCO_2e

Our GHG emissions

To align with industry best practices for Scope 3 reporting, in 2018, we extended our boundaries to include manufacturing emissions beyond Tier 1 suppliers (full upstream to the point of extraction), use of sold products, end-of-life treatment of sold products, and emissions associated with food from our corporate offices. These extended categories will be reported annually going forward.

To estimate our Scope 3 GHG emissions from capital goods manufacturing, we collected Scope 1 and 2 GHG emissions data directly from our Tier 1 hardware contract manufacturers and component suppliers through the CDP Supply Chain platform. Data gaps were estimated using industry average GHG intensities by sector and spend data. GHG emissions beyond our Tier 1 suppliers were estimated—with a high degree of uncertainty—by applying a multiplier based on Google's past carbon footprints.

For Google consumer devices, GHG emissions estimates were based on product life-cycle assessment (LCA) models developed for Google's flagship products sold in 2018. The models were developed from tear-down analyses, bills of materials, data on parts manufacturing, and LCA electronics and material databases provided by third parties.

Integrating sustainability into supplier sourcing

In 2018, we began using the CDP Supply Chain platform to request climate- and water-related data from our key suppliers. Of these 122 suppliers, 93% responded to our climate change survey requests, 88% reported at least one source of GHG emissions, and 66% had set GHG emissions reduction targets.

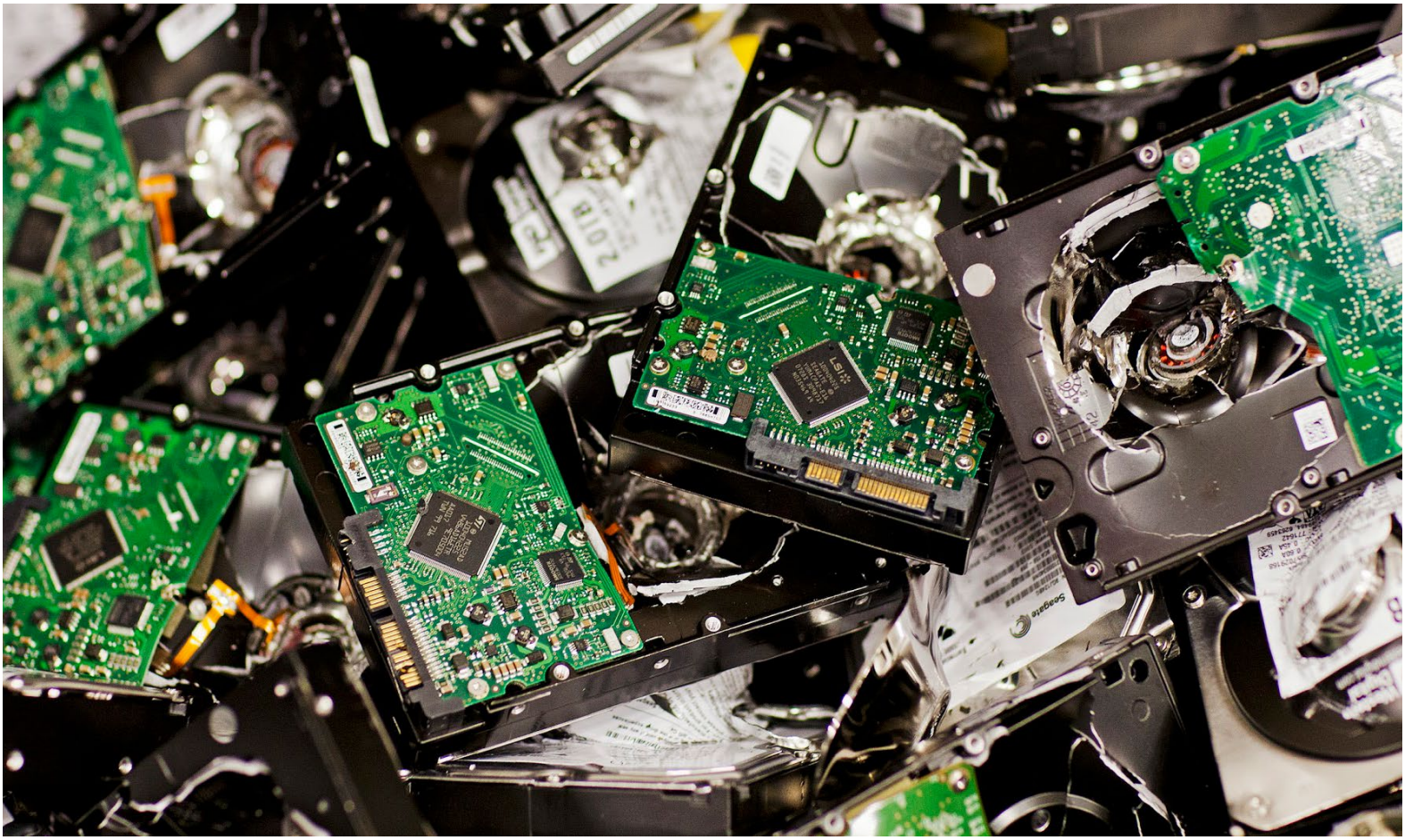
We're continuing to integrate sustainability criteria into our supplier sourcing, including assessing our suppliers' reporting, management, and emissions reduction processes. We're using this data to set goals and priorities for our sustainability program by supplier, commodity, and region as well as to continually improve our analyses of our supply chain GHG emissions.

* Our total emissions are the sum of our Scope 1, Scope 2 (market-based), and Scope 3 emissions. Scope 1, 2, and part of Scope 3 emissions are verified by an independent, accredited verifier. Our electricity use is also part of our Scope 2 verification.

† Scope 1 emissions are direct emissions from sources we own or control, such as company vehicles or generators at Google's offices and data centers.

Scope 2 emissions are indirect emissions from the production of electricity we purchase to run our operations. The location-based category reflects the average carbon intensity of the grids where our operations are located and thus where our energy consumption occurs. The market-based category incorporates our procurement choices, i.e., our renewable energy purchases via contractual mechanisms like power purchase agreements.

Scope 3 emissions are indirect emissions from other sources in our value chain, such as our manufacturing and food suppliers, logistics providers, business travel, employee commuting, and use and end-of-life treatment of Google products.



Working to end our reliance on raw materials

At Google, we have a company-level commitment to maximize the reuse of finite resources across our operations, products, and supply chains and to enable others to do the same by accelerating the transition to a circular economy. This includes rethinking how we build our products and working to keep materials and resources in use for as long as possible. An important part of this framework is going beyond sourcing minerals more responsibly and working to end our collective reliance on raw materials altogether.

SPOTLIGHT

Partnering with suppliers to create a better recycled plastic

Our engineers and materials scientists recently partnered with top-tier plastics suppliers to develop a new post-consumer recycled plastic, which we're already incorporating into our Nest product line.

Read how we're giving scrap plastic new life without sacrificing performance

Partnering on a circular economy for hard disk drives

To build a true circular economy, we need unprecedented collaboration on a massive scale. Circular pathways will require organizations to share information, establish common goals, make collaborative product decisions, and build and maintain trust. Fortunately, we're in good company. The International Electronics Manufacturing Initiative (iNEMI)—a research and development consortium of 90 leading electronics manufacturers, suppliers, associations, government agencies, and universities—recently demonstrated the potential of a collaborative, self-managing, sustainable circular economy for hard disk drives (HDDs).

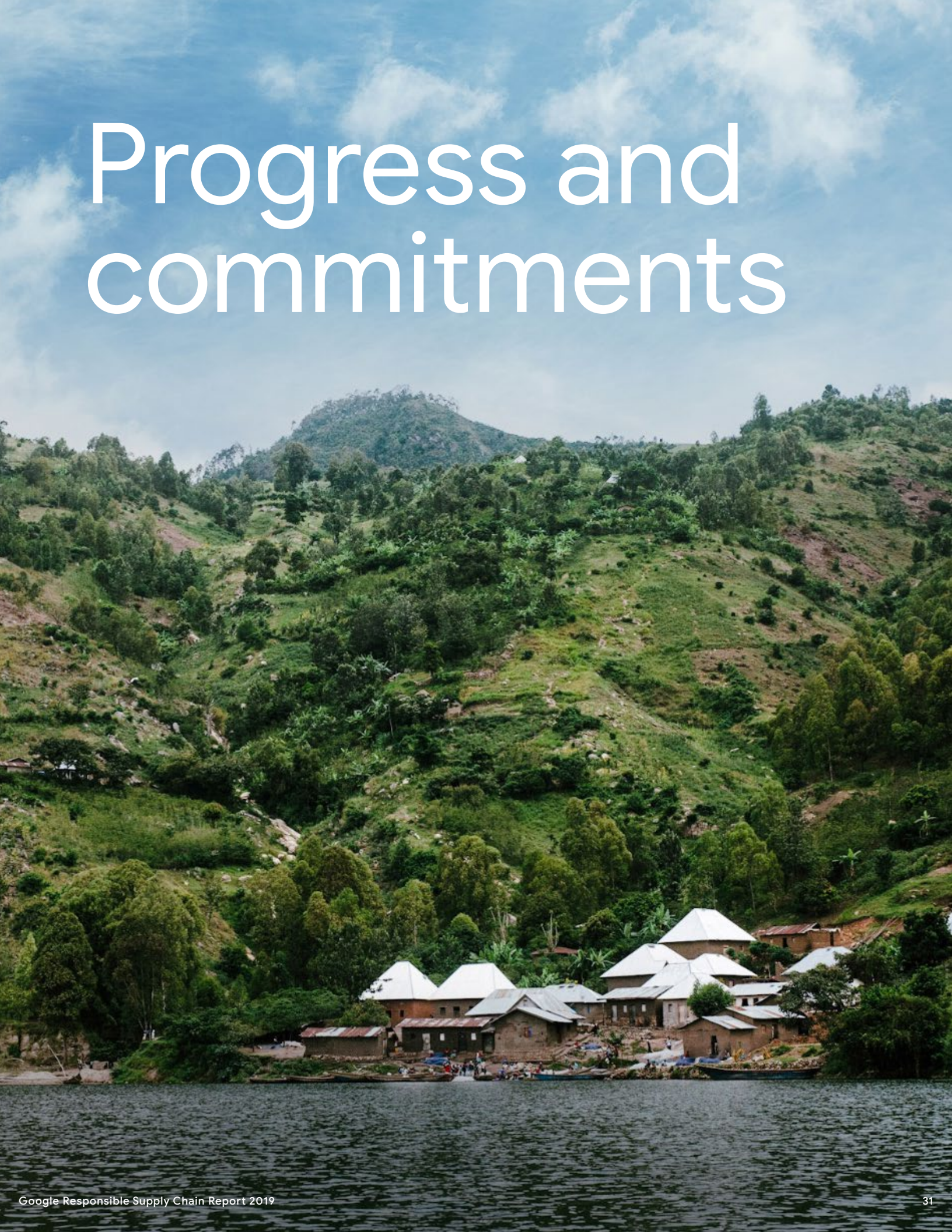
HDDs contain rare-earth elements that are critical to the development of many high-tech products. They're also being consumed at an unsustainable rate, with the risk of supply shortages and disruptions already limiting their availability. These shortages have led some commercial mining interests to explore mining the deep oceans for rare-earth metals—mining expansions we don't support.

In five proof-of-concept demonstrations, iNEMI implemented a collaborative framework that showed new ways to recover these rare-earth elements through the reuse of hard drives or components or the recovery of the elements as powders, oxides, or metals.

In one demonstration, Google collaborated with HDD manufacturer Seagate and value recovery specialist Teleplan to harvest rare-earth voice coil magnet assemblies from hard drives we had retired. Seagate used the magnet assemblies recovered by Teleplan to manufacture new drives on its production line and then returned them to Google. Sourcing magnet assemblies from after-market recyclers rather than magnet suppliers required coordinating an innovative new materials flow and inventory process. This was the first practical demonstration of direct reuse of HDD magnet assemblies. By engaging key stakeholders in the HDD value chain, we were able to reverse rare-earth magnet assembly flows from a linear "take-make-waste" model toward a more circular model where reuse is prioritized.

This systems approach to hard drive manufacturing had never been attempted before and represents an early but important step in building a circular electronics supply chain of the future. Read more in iNEMI's Value Recovery from Used Electronics Project, Phase 2 final report.

Progress and commitments



Creating a more inclusive, resilient, transparent, and connected supply chain is a long-term process. We've set a number of goals—for our own operations and for those of our suppliers—to help accelerate our progress. Here's a look at some of the commitments we've made, our progress in 2018, and new commitments for 2019.

Progress against targets

Putting people first

Target	Deadline	2018 progress	Status
Maintain suppliers' commitment to our Supplier Code of Conduct, and continue to perform social and environmental risk assessments.	Annual	92% of our hardware suppliers and 94% of our targeted extended workforce suppliers have signed Google's Supplier Code of Conduct.	●
Conduct on-site assessments for suppliers identified as high risk and for contract manufacturers.	Annual	We conducted 62 site assessments, for a total of 236 from 2013 to 2018.	●
Conduct worker surveys at 10 additional supplier factories compared with 2017 to increase transparency and identify opportunities for improvement in the areas most important to workers.	2018	1,040 people at 11 supplier factories participated in our worker surveys.	●
Extend Manufacturing Restricted Substances (MRS) training, energy management training, and GHG accounting training to target suppliers based on spend and commodity provided.	2018	168 suppliers participated in MRS training, 13 participated in energy efficiency and renewable energy training, and 44 participated in environmental data and reporting training.	●
Continue reinforcing anti-human trafficking training for suppliers in areas identified as high risk to ensure that 100% of factory sites have received this training.	Annual	Among several 2018 initiatives, we trained our vendors, temporary staff, and independent contractors to report concerns of illegal or unethical activity and to avoid working with parties that engage in modern slavery or other illegal practices. We also provided supplemental online and in-person trainings to workers who manage relationships with higher-risk suppliers.	●
Initiate Human Rights Impact Assessment through the Global Network Initiative.	2018	Completed	●

2019 goals

Maintain suppliers' commitment to our Supplier Code of Conduct and perform risk assessments for all suppliers.
Continue to conduct worker surveys to increase transparency and identify opportunities for improvement in the areas most important to workers.
Expand Supplier Code of Conduct trainings for strategic suppliers and supplier managers in areas like humane treatment of workers, forced labor, and modern slavery.
Using MRS declarations, identify the potential process chemical risks at 140 supplier sites.

Progress against targets (continued)

Strengthening communities

Target	Deadline	2018 progress	Status
Continue to work toward ensuring that our suppliers source only from smelters that are conformant with the Conflict-Free Smelter Program assessment protocols.	Annual	100% of the smelters or refiners we used in 2018 were conformant, active,[9] or verified by a third party to source from countries other than those covered in the 2010 Dodd-Frank Act.	●
Continue engaging with cross-industry groups to expand conflict-free and responsible sourcing options through initiatives such as smelter audits and materials chain-of-custody verification.	Annual	We contributed to the Responsible Minerals Initiative by supporting audit funds, training, and research on gold. We also funded the Responsible Artisanal Gold Solutions Forum and two new research initiatives. The first examines the links between conflict, conservation, livelihoods, and renewable energy interventions. The other looks at responsible minerals beyond conflict definitions and geographic constraints in hopes of developing improved models for production, consumption, and sustainability in supply chains.	●
Drive collaboration activities with external stakeholders to better understand child labor in the cobalt and conflict minerals supply chains; develop strategies to eliminate these practices completely.	Annual	We completed a multi-company collaboration and grant with Pact to address child labor in cobalt and tin mining. The collaboration supported local capacity building and systems strengthening for regional organizations working on child labor issues and organizations focused on improving working conditions and outcomes for adults in the sector.	●
Continue conflict minerals training for new suppliers and for suppliers that are not using 100% Compliant smelters.	Annual	Completed and ongoing	●

2019 goals

Continue to work toward ensuring that our suppliers source from smelters that are 100% conformant with the Conflict-Free Smelter Program assessment protocols.

Continue engaging with cross-industry groups to expand conflict-free and responsible sourcing options through initiatives such as smelter audits and materials chain-of-custody verification in multiple high-risk areas.

Continue collaborative activities with external stakeholders and cross-industry groups that reinforce responsible sourcing of minerals and improved human rights outcomes.

Continue to develop strategies to eliminate child labor in cobalt supply chains, and increase renewable energy around mining communities committed to responsible sourcing.

Drive increased transparency and traceability in minerals value chains, and support root-cause interventions that reinforce responsible and ethical supply chains.

Progress against targets (continued)

Protecting the planet

Target	Deadline	2018 progress	Status
Work toward ensuring that 90% of suppliers are reporting GHG emissions reduction targets.	2018	In 2018, we shifted to using the CDP Supply Chain platform to request climate- and water-related data from our key suppliers: 93% of our suppliers responded to our climate change survey requests, 88% of our suppliers reported at least one source of GHG emissions, and 66% of our suppliers had set GHG emissions reduction targets.	
Complete 10 additional energy-efficiency audits at supplier factories, and develop programs globally that encourage suppliers to further adopt energy management systems such as ISO 50001.	2018	We completed 10 on-site energy-efficiency and renewable energy assessments at supplier factories, helping suppliers identify $13 million in annual savings potential through the adoption of energy-efficiency measures. We also helped suppliers identify over 16 megawatts of on-site solar PV potential.	
Establish a baseline of renewable energy use among our largest suppliers as measured by supplier spend.	Annual	We established a baseline of renewable energy use by our suppliers based on the data they reported to us. We continue to work with many of our suppliers to more fully understand the sources of their electricity and enable their transition to renewable energy.	
Calculate the carbon footprint associated with manufacturing our products throughout their life cycle, and work to increase the proportion of suppliers providing data to 90% of our supplier spend.	2018	We conducted LCAs and published product environmental reports for Google's flagship products. Additionally, we asked suppliers covering 75% of our 2018 hardware inventory spend to participate in our supplier data collection effort. In 2018, our active hardware suppliers that signed Google's Supplier Code of Conduct covered 88% of our total spend and 90% of estimated manufacturing emissions from our direct hardware suppliers.	
Through collaborations, develop a pilot to recover rare-earth magnets from HDDs.	2018	Through industry collaboration, we helped successfully develop a proof-of-concept demonstration to recover rare-earth elements through the direct reuse of magnet assemblies from retired hard drives in the production of new drives.	

2019 goals

Work toward ensuring that 90% of our suppliers responding to our environmental surveys report GHG emissions and at least 50% report GHG emissions reduction targets through the CDP Supply Chain platform.

Complete 10 additional on-site energy-efficiency assessments at supplier factories, and continue to develop programs that accelerate the transition of supplier sites over to renewable energy.

Work toward increasing renewable energy use in our supply chain through direct supplier engagement, renewable energy investments, and the open-source collaborative platform, which is designed to reduce the cost and accelerate supplier adoption of renewable energy around the world.

Calculate the carbon footprint associated with manufacturing our products throughout their life cycle, and work to increase the proportion of suppliers providing data to 90% of our supplier spend.

Finalize the quantification of the life-cycle environmental impacts of value recovery options for rare-earth magnets from HDDs.

Appendix

Appendix

Audit conformance data by category and criteria, including improvements following corrective action plans (2013–2018)

Audit criteria	Unique audited supplier factories with non-conformance findings	Improvement in conformance after CAP	Audited supplier factories in conformance after CAP
Labor total	**86.41%**	**79.89%**	**93.48%**
Freely Chosen Employment	26.09%	22.83%	96.74%
Child Labor Avoidance; Student Interns	26.63%	25.54%	98.91%
Working Hours	80.98%	74.46%	93.48%
Wages and Benefits	52.72%	48.37%	95.65%
Humane Treatment	8.15%	8.15%	100.00%
Non-Discrimination	10.33%	9.78%	99.46%
Freedom of Association and Collective Bargaining	11.96%	11.96%	100.00%
Immigration Law and Compliance	0.54%	0.54%	100.00%
Other	4.89%	4.89%	100.00%
Health & Safety total	**82.07%**	**76.63%**	**94.57%**
Health & Safety Management System	2.17%	1.63%	99.46%
Occupational Safety	59.78%	56.52%	96.74%
Emergency Preparedness	67.93%	63.59%	95.65%
Occupational Injury and Illness	35.87%	32.07%	96.20%
Industrial Hygiene	36.41%	35.87%	99.46%
Physically Demanding Work	12.50%	11.96%	99.46%
Machine Safeguarding	20.11%	19.57%	99.46%
Sanitation, Food, and Housing	28.80%	26.63%	97.83%
Environment total	**67.39%**	**63.04%**	**95.65%**
Environmental Management System	2.17%	1.63%	99.46%
Environmental Permits and Reporting	23.37%	22.83%	99.46%
Hazardous Substances	54.89%	50.54%	95.65%
Wastewater and Solid Waste	21.74%	20.65%	98.91%
Air Emissions	11.41%	10.87%	99.46%
Product Content Restrictions	3.26%	2.72%	99.46%
Resource Efficiency	9.78%	8.70%	98.91%

Appendix

Audit criteria	Unique audited supplier factories with non-conformance findings	Improvement in conformance after CAP	Audited supplier factories in conformance after CAP
Ethics total	**29.89%**	**27.17%**	**97.28%**
Business Integrity; No Improper Advantage	20.11%	19.57%	99.46%
Disclosure of Information	2.17%	1.63%	99.46%
Intellectual Property	8.15%	7.07%	98.91%
Fair Business, Advertising, and Competition	4.35%	3.80%	99.46%
Responsible Sourcing of Minerals	3.80%	3.80%	100.00%
Privacy	6.52%	5.98%	99.46%
Non-Retaliation	13.59%	11.96%	98.37%
Other	1.09%	1.09%	100.00%
Management System total	**55.98%**	**52.17%**	**96.20%**
Company Commitment	6.52%	5.43%	98.91%
Management Accountability and Responsibility	17.39%	16.30%	98.91%
Legal and Customer Requirements	19.57%	18.48%	98.91%
Risk Assessment and Risk Management	23.91%	21.74%	97.83%
Improvement Objectives	19.57%	18.48%	98.91%
Training	10.87%	10.33%	99.46%
Communication	9.24%	8.15%	98.91%
Worker Feedback and Participation	5.43%	5.43%	100.00%
Audits and Assessments	17.93%	15.76%	97.83%
Corrective Action Process	3.26%	3.26%	100.00%
Documentation and Records	4.35%	3.80%	99.46%
Supplier Responsibility	26.09%	24.46%	98.37%

Endnotes

1. For the purposes of this report, "Compliant" smelters or refiners are those that are conformant, active, or verified by a third party to source from countries other than those covered in the 2010 Dodd-Frank Act.
2. *Global Estimates of Modern Slavery: Forced Labour and Forced Marriage*, International Labour Organization and Walk Free Foundation, 2017, https://www.ilo.org/wcmsp5/groups/public/—dgreports/—dcomm/documents/publication/wcms_575479.pdf.
3. Audits in 2018 took place in China, India, Japan, Philippines, South Korea, Taiwan, and the United States.
4. Smelters and refiners are defined as "conformant" or "active" by the Responsible Minerals Initiative. Conformant smelters or refiners are those that have been audited and meet the criteria for not directly or indirectly supporting the conflict; active smelters or refiners are those in the process of being audited.
5. In 2019, Google joined the World Economic Forum's Global Battery Alliance to further our work on responsible minerals.
6. See note 1 above.
7. Delve (website), accessed 2019, https://delvedatabase.org.
8. "Democratic Republic of the Congo," Power Africa fact sheet, USAID, March 2019, https://www.usaid.gov/powerafrica/democratic-republic-congo.
9. See note 4 above.

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Additional resources

Modern Slavery Statements (2018, 2017, 2016)

Supplier Code of Conduct

SEC filings (2018, 2017, 2016, 2015, 2014)

Responsible Supply Chain Report (2018, 2017)