

Alphabet

# CDP Climate Change Response 2021

## C0. Introduction

---

### C0.1

---

#### **(C0.1) Give a general description and introduction to your organization.**

This is our 15th consecutive year responding to the CDP Climate Change questionnaire. We began calculating our annual carbon footprint in 2006. Every year since 2009, we've publicly reported the results to CDP.

As our founders Larry and Sergey wrote in the original founders' letter, "Google is not a conventional company. We do not intend to become one." That unconventional spirit has been a driving force throughout our history, inspiring us to tackle big problems, and invest in moonshots like artificial intelligence ("AI") research and quantum computing.

Alphabet is a collection of businesses—the largest of which is Google—which we report as two segments: Google Services and Google Cloud. We report all non-Google businesses collectively as Other Bets. Our Other Bets include earlier stage technologies that are further afield from our core Google business.

Our mission to organize the world's information and make it universally accessible and useful is as relevant today as it was when we were founded in 1998. Since then, we've evolved from a company that helps people find answers to a company that helps you get things done. We're focused on building an even more helpful Google for everyone, and we aspire to give everyone the tools they need to increase their knowledge, health, happiness and success.

#### **Google Services**

We have always been a company committed to building helpful products that can improve the lives of millions of people. Our product innovations have made our services widely used, and our brand one of the most recognized in the world. Google Services' core products and platforms include Android, Chrome, Gmail, Google Drive, Google Maps, Google Photos, Google Play, Search, and YouTube, each with broad and growing adoption by users around the world.

Google Services generates revenues primarily by delivering both performance advertising and brand advertising.

#### **Google Cloud**

Google was a company built in the cloud. We continue to invest in infrastructure, security, data management, analytics and AI. We see significant opportunity in helping businesses utilize these strengths with features like data migration, modern development environments and machine learning tools to provide enterprise-ready cloud services, including Google Cloud Platform and Google Workspace (formerly known as G Suite). Google Cloud Platform enables developers to build, test, and deploy applications on its highly scalable and reliable infrastructure. Our Google Workspace collaboration tools — which include apps like Gmail, Docs, Drive, Calendar, Meet and more — are designed with real-time collaboration and machine intelligence to help people work smarter.

Google Cloud generates revenues primarily from fees received for Google Cloud Platform services and Google Workspace collaboration tools.

Our Class A common stock has been listed on the Nasdaq Global Select Market under the symbol "GOOG" since August 19, 2004 and under the symbol "GOOGL" since April 3, 2014. Our Class C capital stock has been listed on the Nasdaq Global Select Market under the symbol "GOOG" since April 3, 2014.

Our headquarters are located in Mountain View, California. We also own and lease office and building space in the surrounding areas near our headquarters. In addition, we own and lease office/building space and research and development sites around the world, primarily in North America, Europe, South America, and Asia. At the end of 2020, we had 26 operational campuses across 23 data center locations on four continents. Some of our locations have more than one data center campus and others were not yet operational during 2020.

As of December 31, 2020, Alphabet had 135,301 employees. Our revenues for the fiscal year ended on December 31, 2020 were \$182.5 billion, over 99% of which came from the Google Services segment and the Google Cloud segment.

As used herein, "Alphabet," "the company," "we," "us," "our," and similar terms include Alphabet Inc. and its subsidiaries, unless the context indicates otherwise.

Alphabet's responses to this Questionnaire contain projections, future estimates, plans, expectations, and other forward-looking statements that are subject to risks and uncertainties. Readers are cautioned not to place undue reliance on these forward-looking statements. Forward-looking statements are not guarantees of future performance and actual results may differ materially from those reflected in the forward-looking statements for a number of reasons, including, but not limited to, risks discussed in Alphabet's Annual Report on Form 10-K, Quarterly Report on Form 10-Q, and other documents it files with the Securities and Exchange Commission. Alphabet undertakes no obligation to correct, revise or update any information included in this Questionnaire.

---

## C0.2

**(C0.2) State the start and end date of the year for which you are reporting data.**

|                | Start date     | End date         | Indicate if you are providing emissions data for past reporting years | Select the number of past reporting years you will be providing emissions data for |
|----------------|----------------|------------------|---|--|
| Reporting year | January 1 2020 | December 31 2020 | No  | <Not Applicable>   |

**C0.3**

**(C0.3) Select the countries/areas for which you will be supplying data.**

- Argentina
- Australia
- Austria
- Belgium
- Brazil
- Canada
- Chile
- China
- China, Hong Kong Special Administrative Region
- Colombia
- Croatia
- Czechia
- Denmark
- Finland
- France
- Germany
- Ghana
- Greece
- Hungary
- India
- Indonesia
- Ireland
- Israel
- Italy
- Japan
- Kenya
- Lithuania
- Malaysia
- Mexico
- Netherlands
- New Zealand
- Nigeria
- Norway
- Peru
- Philippines
- Poland
- Portugal
- Republic of Korea
- Romania
- Russian Federation
- Singapore
- Slovakia
- South Africa
- Spain
- Sweden
- Switzerland
- Taiwan, Greater China
- Thailand
- Turkey
- Ukraine
- United Arab Emirates
- United Kingdom of Great Britain and Northern Ireland
- United States of America

**C0.4**

**(C0.4) Select the currency used for all financial information disclosed throughout your response.**

- USD

C0.5

(C0.5) Select the option that describes the reporting boundary for which climate-related impacts on your business are being reported. Note that this option should align with your chosen approach for consolidating your GHG inventory.

Operational control

C1. Governance

C1.1

(C1.1) Is there board-level oversight of climate-related issues within your organization?

Yes

C1.1a

(C1.1a) Identify the position(s) (do not include any names) of the individual(s) on the board with responsibility for climate-related issues.

| Position of individual(s) | Please explain  |
|---------------------------|---|
| Board-level committee     | Alphabet's Board of Directors has delegated to the Audit and Compliance Committee the primary responsibility for the oversight of many of the risks facing our businesses. The Audit and Compliance Committee's charter provides that it will review and discuss with management any major risk exposures, including sustainability risks, which can include climate-related issues, and the steps Alphabet takes to detect, monitor, and actively manage such exposures. An example of a climate-related decision made by Alphabet's Board of Directors in 2020, at the recommendation of the Audit and Compliance Committee, was approving the issuance of \$5.75 billion in sustainability bonds—the largest sustainability or green bond issuance by any company in history at the time. The proceeds from these sustainability bonds will fund ongoing and new projects that are environmentally or socially responsible. Our Chief Financial Officer (CFO) and Google's Sustainability Officer (GSO) keep the Audit and Compliance Committee apprised of our sustainability strategy and climate-related issues on an as-needed basis. Our CFO also has responsibility for overseeing climate-related issues, including signing our CDP report, as she has visibility across all company operations. Our CFO meets with Alphabet's Board of Directors regularly and brings up climate-related issues on an as-needed basis. Primary responsibility for managing climate-related issues is delegated to our GSO, who reports up to our CFO. An example of a climate-related decision made by our CFO was for Alphabet to become a formal supporter of the Task Force on Climate-related Financial Disclosures (TCFD), which we announced in a press release on April 20, 2021. |

C1.1b

(C1.1b) Provide further details on the board's oversight of climate-related issues.

| Frequency with which climate-related issues are a scheduled agenda item | Governance mechanisms into which climate-related issues are integrated   | Scope of board-level oversight | Please explain   |
|---|--|--------------------------------|--|
| Scheduled – some meetings   | Reviewing and guiding risk management policies<br>Monitoring and overseeing progress against goals and targets for addressing climate-related issues | <Not Applicable>               | Our CFO and Google's Sustainability Officer (GSO) keep the Audit and Compliance Committee of Alphabet's Board of Directors apprised of climate-related issues, and raise these issues on an as-needed basis. Climate-related issues may also be added to the agenda for meetings of Alphabet's full Board of Directors on an as-needed basis. Climate-related issues are integrated into our risk management process and goals/targets. We also have a non-independent internal Sustainability Board focused on scaling sustainability impact through strategic cross-functional alignment. It includes senior executives from across the company with diverse skills, from teams including operations (e.g. Cloud; development, real estate and security), products (e.g. Google Earth and Maps; devices and services; and Search), research, finance (e.g. investor relations and treasury), marketing, legal, PR/communications, and policy. This group is chaired by a Vice President, Finance, and meets on a quarterly basis to discuss, review and approve climate-related initiatives, and to provide recommendations and guidance. Our GSO leads engagement with the Sustainability Board and reports to them quarterly. Climate-related issues are a scheduled agenda item for all meetings of our Sustainability Board. Through the Sustainability Board, climate-related risks are integrated into our organizational strategy, plans of action, management policies, performance objectives; and how we monitor progress against targets and goals. |

C1.2

(C1.2) Provide the highest management-level position(s) or committee(s) with responsibility for climate-related issues.

| Name of the position(s) and/or committee(s) | Reporting line   | Responsibility  | Coverage of responsibility | Frequency of reporting to the board on climate-related issues |
|---|------------------|---|----------------------------|---|
| Chief Sustainability Officer (CSO)          | <Not Applicable> | Both assessing and managing climate-related risks and opportunities | <Not Applicable>           | Quarterly   |

C1.2a

**(C1.2a) Describe where in the organizational structure this/these position(s) and/or committees lie, what their associated responsibilities are, and how climate-related issues are monitored (do not include the names of individuals).**

Primary responsibility for managing climate-related issues is delegated to our GSO, who leads sustainability across Google's worldwide operations, products and supply chain and ensures alignment of our climate strategy across different business units. Our GSO reports up to our CFO and provides updates as needed. The GSO oversees the global sustainability team, which leads much of Alphabet's work on assessing and managing climate-related risks and opportunities, including programs such as carbon accounting and reporting, carbon offsets management, our 10+ year commitment to carbon neutrality, our climate resilience strategy (including our climate scenario analysis), climate-related disclosures, engagement with employees on sustainability issues, and our work to enable people to live more sustainably via our core products.

Our GSO leads cross-functional strategy and collaboration with sustainability teams across the company—including teams such as real estate sustainability, data center sustainability, and consumer hardware sustainability—and the leads for these teams have a dotted line report to our GSO. Our GSO facilitates a monthly meeting between dozens of employees with key sustainability leadership roles across various departments, including designated sustainability representatives from teams such as Google Earth, policy, and Cloud marketing. Our GSO also coordinates development and monitoring of company-wide sustainability objectives and targets, including financial planning. Lastly, our GSO engages with government policy-makers at a local, federal, and international level on sustainability topics as needed to support efforts led by our policy team. For example, our GSO has engaged with the European Commission and various federal agencies about Google's sustainability initiatives, as well as with municipal officials in the San Francisco Bay Area and other cities about climate resilience.

Our GSO also has a dotted line report to Google's Senior Vice President of Cloud Infrastructure, who is responsible for data center operations, in addition to many other responsibilities. As our data centers represent the vast majority of our electricity use, Google's Senior VP of Cloud Infrastructure has a strong interest in improving energy efficiency, leading Google's work to purchase renewable energy for our operations, and working towards our goal of operating on carbon-free energy 24/7 by 2030.

The highest management level of direct responsibility for climate change rests with the Senior Vice President and Chief Financial Officer (CFO) of Alphabet and Google, who is responsible for overseeing climate-related issues as she has visibility across all of the company's operations. Our CFO is the final sign-off for Alphabet's CDP climate change report, which summarizes our assessment and management of climate-related risks and opportunities.

Alphabet's Board of Directors has delegated to the Audit and Compliance Committee the primary responsibility for the oversight of many of the risks facing our businesses. The Audit and Compliance Committee's charter provides that it will review and discuss with management any major risk exposures, including sustainability risks, and the steps Alphabet takes to detect, monitor, and actively manage such exposures.

Our CFO meets with Alphabet's Audit and Compliance Committee and Board of Directors regularly and raises climate-related issues on an as-needed basis. Other people may also be requested to present climate-related information to the Board of Directors. For example, Google's Sustainability Officer (GSO) keeps the Audit and Compliance Committee apprised of our sustainability strategy and climate-related issues on an as-needed basis.

We also have a non-independent internal Sustainability Board focused on scaling sustainability impact through strategic cross-functional alignment. It includes senior executives from across the company with diverse skills, from teams including operations (e.g. Cloud; development, real estate and security), products (e.g. Google Earth and Maps; devices and services; and Search), research, finance (e.g. investor relations and treasury), marketing, legal, PR/communications, and policy. This group is chaired by a Vice President, Finance, and meets on a quarterly basis to discuss, review and approve climate-related initiatives, and to provide recommendations and guidance. Our GSO leads engagement with the Sustainability Board and reports to them quarterly.

Climate-related issues are a scheduled agenda item for all meetings of our Sustainability Board. Through the Sustainability Board, climate-related risks are integrated into our organizational strategy, plans of action, management policies, performance objectives; and how we monitor progress against targets and goals.

**C1.3**

**(C1.3) Do you provide incentives for the management of climate-related issues, including the attainment of targets?**

|       | Provide incentives for the management of climate-related issues | Comment   |
|-------|---|---|
| Row 1 | Yes   | Through quarterly individual- and team-level target-setting, regular performance reviews, and bonus programs, performance for some employees is tied to meeting targets related to improved energy efficiency, reduced energy use, reduced carbon emissions, and increased renewable energy procurement. In 2022, we intend to introduce a bonus program for members of Google's senior executive team. Payouts under the program will be determined in part by performance tied to Environmental, Social, and Governance (ESG) goals. The bonus program will be designed to increase focus on creating lasting, meaningful change. |

**C1.3a**

**(C1.3a) Provide further details on the incentives provided for the management of climate-related issues (do not include the names of individuals).**

| Entitled to incentive                        | Type of incentive   | Activity incentivized   | Comment   |
|--|---------------------|---|---|
| Other, please specify (Data center engineer) | Monetary reward     | Efficiency project  |   |
| Energy manager                               | Monetary reward     | Energy reduction project<br>Energy reduction target   |   |
| Facilities manager                           | Monetary reward     | Efficiency project<br>Efficiency target   |   |
| Environment/Sustainability manager           | Monetary reward     | Emissions reduction project<br>Emissions reduction target<br>Company performance against a climate-related sustainability index |   |
| Procurement manager                          | Monetary reward     | Environmental criteria included in purchases<br>Supply chain engagement   |   |
| Public affairs manager                       | Monetary reward     | Behavior change related indicator   | This encompasses communications/ marketing/ public affairs managers and is tied to targets related to raising awareness about sustainability initiatives.   |
| Corporate executive team                     | Monetary reward     | Emissions reduction target  | For Google's Senior VP of Cloud Infrastructure, a member of the Corporate Executive Team, performance bonuses are tied to meeting quarterly targets for improving the sustainability / energy efficiency of our operations.   |
| All employees                                | Non-monetary reward | Behavior change related indicator   | Google runs an annual employee recognition program to recognize Googler individuals and teams around the world who are driving sustainability across the company and in the communities where we operate. Several VPs and Senior VPs are involved in the final selection process and finalists are celebrated at an internal awards ceremony. |

**C2. Risks and opportunities**

**C2.1**

**(C2.1) Does your organization have a process for identifying, assessing, and responding to climate-related risks and opportunities?**

Yes

**C2.1a**

**(C2.1a) How does your organization define short-, medium- and long-term time horizons?**

|             | From (years) | To (years) | Comment  |
|-------------|--------------|------------|--|
| Short-term  | 1            | 8          | In 2017, we conducted a Phase 2 assessment of Google's exposure to climate risk, which incorporated near-term climate projections (2020/2025). This represented a 1 to 8 year short-term time horizon. |
| Medium-term | 9            | 34         | In 2016, we conducted a Phase 1 assessment of Google's exposure to climate risk in the mid-term (2050) and long-term (2100). This represented a 9 to 34 year medium-term time horizon.                 |
| Long-term   | 35           | 84         | In 2016, we conducted a Phase 1 assessment of Google's exposure to climate risk in the mid-term (2050) and long-term (2100). This represented a 35 to 84 year long-term time horizon.                  |

**C2.1b**

**(C2.1b) How does your organization define substantive financial or strategic impact on your business?**

Among other considerations, we reference the framework established in SEC guidance to help assess substantive financial impact on our business. We consider quantitative and qualitative factors when determining significance with respect to financial reporting and matters related to financial reporting. To define substantive financial or strategic impact for the purposes of CDP reporting, Google applies a hypothetical rough rule of thumb measure that is approximately \$1 billion annually at the P&L level.

Factors that could harm our business and operating results in material ways include: Changes in international and local social, political, economic, tax, and regulatory conditions or in laws and policies governing a wide range of topics may increase our cost of doing business, limit our ability to pursue certain business models, offer products or services in certain jurisdictions, or cause us to change our business practices. These same factors apply when identifying or assessing climate-related risks.

In particular, changes to energy policies and the availability of contractual structures that allow end-users to purchase renewable energy for their operations could have a substantive impact on our business. For example, the elimination of policies that enable corporate end users to purchase clean energy would make it more difficult for Google to meet its carbon-free energy goals by decreasing access to renewable energy in states where we operate. This would mean we would have to find other alternatives to procure carbon-free energy, which could be more expensive or located outside of the grids where we operate.

Regarding energy costs specifically, we evaluate the net present value of entering into a renewable energy supply contract by comparing the business-as-usual scenario to energy costs under the long-term clean energy scenario. If we find that clean energy will significantly reduce the carbon intensity of our electricity supply and be more economical, these are very important inputs to identify a project as an opportunity as well as to decide whether or not to enter into a long-term contract.

One of our risk mitigation activities is our work to procure renewable energy for our operations via long-term contracts with stable prices. In 2019, we announced a 1.6 GW package of agreements that represents our biggest commitment ever to purchase renewable energy—and the largest such announcement made by any corporation at the time. As of 2020, the total capacity of our renewable energy projects under contract was nearly 6 GW.

Although we are unable to make precise estimates for this risk, changes to policies regarding corporate procurement of renewable energy could have a substantive strategic impact on our business as well as on our goal of operating on carbon-free energy by 2030.

Creating a carbon-free energy system in which any organization has access to a simple and cost-effective marketplace is achievable only through large-scale, coordinated action—and we know we can't do it alone. In 2019, Google helped lead the establishment of the Renewable Energy Buyers Alliance (REBA), the world's largest organization of corporate renewable energy buyers. As a founding member of REBA, we're leading an effort to bring together more than 200 renewable energy buyers, developers, and service providers to pave the way for any company to access and purchase renewable energy. Collectively, this group has committed to purchasing 60 GW of renewable energy by 2025.

---

**C2.2**

**(C2.2) Describe your process(es) for identifying, assessing and responding to climate-related risks and opportunities.**

**Value chain stage(s) covered**

Direct operations

**Risk management process**

Integrated into multi-disciplinary company-wide risk management process

**Frequency of assessment**

More than once a year

**Time horizon(s) covered**

Short-term

Medium-term

Long-term

**Description of process**

Our response considers activities that are short-, medium-, and long-term. Several of these activities, such as renewable energy procurement and our urban ecology program, are assessed on an ongoing basis (i.e. more than once a year). On behalf of Alphabet and Google's CFO and Google's Senior VP of Cloud Infrastructure, our GSO collaborates with risk management and operations teams to ensure risks and opportunities are identified and evaluated across the company for mitigation of and adaptation to climate change. Geographical areas considered in risk and opportunities management include Google's Bay Area headquarters, its major global office operations, and 23 global data center locations. Results of risk and opportunity assessments are reported to a cross-functional group of key internal stakeholders, including executives in operations and finance. The scope of the process considers regulatory risks due to climate change that could increase energy costs, across all of Alphabet's operations globally. Results are reported to the CFO for Alphabet and Google, who can bring up climate-related issues to the Board as needed. These risks and opportunities are primarily assessed at a company level by modeling likely future energy cost scenarios under climate change regulation, and applying these scenarios to estimate the cost impact to our overall operations. In an effort to mitigate these risks and to work towards our goal of operating on carbon-free energy on a 24/7 basis by 2030, we look for opportunities to procure renewable energy via long-term contracts with stable prices, such as power purchase agreements (PPAs). By the end of 2020, Google had signed more than 55 renewable energy agreements, which will provide nearly 6 GW of renewable energy that is new to the grid. This makes Google the world's largest annual corporate purchaser of renewable energy. There are many elements we consider in deciding where and how to pursue renewable energy supply contracts, including the emissions reduction potential of sourcing renewable energy by displacing electricity with a high carbon intensity and the cost-competitiveness of renewable energy over the long term. Regarding energy costs specifically, we evaluate the net present value of entering into a renewable energy supply contract by comparing the business-as-usual scenario to energy costs under the long-term clean energy scenario. Clean energy projects are commercially attractive if we find that they will significantly reduce the carbon intensity of our electricity supply and are likely to be more economical over the long-term. Under such circumstances, we may decide to enter into a long-term contract. Long-term renewable energy contracts are one of the most important tools we have in mitigating risk and providing opportunity with respect to climate change, because they can reduce emissions while keeping energy costs known and manageable. Risks and opportunities are also assessed at an asset level by using the same models applied to both transition risks and physical risks. As an example of a case study from a transition risk perspective, running our business requires us to use a lot of electricity to power our data centers, offices, and other infrastructure. In 2020, our total energy consumption was 15,439,538 MWh. Google faces the risk of increased costs of energy if a price on carbon is applied through legislation such as cap and trade (or other mechanisms such as taxation). We use carbon prices as part of our risk assessment model, to support strategic decision-making related to future capital investments. For instance, the risk assessment at individual data center facilities also includes using a shadow price for carbon to estimate expected future energy costs. As a result, to mitigate this risk, we operate some of the most efficient data centers in the world, procure carbon-free energy for our operations, and generate onsite renewable energy at several of our offices and at our data center in Belgium. We already include a shadow price for carbon in our data center siting analysis so we take this risk into account even before we build a data center. Finally, we reach carbon neutrality for our operations via three steps: energy efficiency, renewable energy procurement, and purchasing high-quality carbon offsets for any remaining emissions we haven't yet eliminated. For our global office locations, Google assesses risk and opportunity based on specific climate risk factors. To prioritize each risk and opportunity identified, we consider three key factors: its potential impact on our financial bottom line, its potential impact to our company's reputation, and progress towards our 24/7 carbon-free energy and greenhouse gas emissions reduction targets. We weigh these and other factors on a case by case basis, depending on the risk/opportunity being prioritized. In 2020, Google conducted an updated climate risk assessment, building on the previous risk assessment that was conducted in 2017. This included climate scenario analysis, referencing RCP 4.5 and 8.5, and an assessment of the impact of flooding, water stress, extreme heat, and wildfires on 26 priority office sites and 23 data center locations. The key result of this scenario analysis was that increased exposure to extreme heat and flooding is likely to impact many of our global offices and data centers as early as 2030. Since flooding and extreme heat emerged as critical climate risks that could have a significant impact on physical assets and occupants, they have been considered as part of the overall development strategy for Google's expanding footprint. As an example of a case study from a physical risk perspective, we launched Google's Ecology Program in 2014 with the goal of enhancing ecological resilience, focusing on the following objectives: expanding wildlife habitat, creating diverse landscapes that can withstand the stresses of climate change, and restoring many of the ecological functions lost with the development of office parks across Silicon Valley. We leveraged cutting-edge science and data to create the Landscape Resilience Framework for ecological planning in the region, in partnership with the San Francisco Estuary Institute. We engaged with ecologists, landscape architects, planners, and local nongovernmental organizations to ensure that our outdoor environments would enhance the region's existing ecology over time. As a result, Google has planted 1.4 acres of native vegetation in our "Green Loop," added roughly 5.9 acres of riparian habitat and 1,800 native trees to the Charleston Retention Basin, and designed our Bay View site like a bay's edge, with large meadows, emergent and freshwater marsh, and one of the largest willow groves ever planted in the region. For more information on Google's Urban Ecology program, see: <https://sustainability.google/projects/urban-ecology/>

**C2.2a**

---



**(C2.2a) Which risk types are considered in your organization's climate-related risk assessments?**

|                     | Relevance & inclusion        | Please explain   |
|---------------------|------------------------------|--|
| Current regulation  | Relevant, always included    | We are closely monitoring state renewable energy and clean energy standards in the United States. We see these policies as critical to help drive low-carbon power sources in states where we have offices and data centers. An elimination of policies that enable corporate end users to purchase clean energy would make it more difficult for Google to meet its carbon-free energy goals by decreasing access to renewable energy in states where we operate. This would mean we would have to find other alternatives to procure carbon-free energy, which could be more expensive or located outside of the grids where we operate. For example, in 2019, Ohio rolled back their renewable energy portfolio standards from 12.5% to 8.5%, which added an additional hurdle to Google's ability to source renewable energy for our Ohio data center site over the long term. The scope of our risk assessment process considers regulatory risks due to climate change that could increase energy costs, across all of Alphabet's operations globally. Our Google Sustainability Officer reports these results to our Chief Financial Officer, who can bring up any climate-related issues to the Board as needed.   |
| Emerging regulation | Relevant, always included    | We have few direct emissions of greenhouse gases, therefore we do not expect our operations to be directly impacted by climate policy in the United States, nor do we expect to participate in any current or future compliance markets for carbon trading in the United States. Google does, however, face the risk of increased costs of energy if a price on carbon is applied through legislation such as cap and trade (or other mechanisms such as taxation). As an example, running our business requires us to use a lot of electricity to power our data centers, offices, and other infrastructure. In 2020, our total energy consumption was 15,439,538 MWh. To the extent that a price on carbon is applied through legislation and passed on to us from a regulated entity, the cost of running our operations would likely increase. Our risk assessments at individual data centers include using a shadow price for carbon to estimate expected future energy costs.   |
| Technology          | Relevant, always included    | An example of a potential technology-related risk could be maintaining the environmental performance of data centers as demand for digital products, and the amount of compute needed to power these applications, increases dramatically. However, this is a low risk, as we've worked for more than a decade to make Google data centers some of the most efficient in the world. We outfit each data center with high-performance servers that we've custom-designed to use as little energy as possible. We improve facility energy use by installing smart temperature and lighting controls and redesigning how power is distributed to reduce energy loss. We're also applying machine learning to drive energy efficiency even further and automatically optimize cooling. As a result, a Google data center is, on average, twice as energy efficient as a typical enterprise data center, and compared with five years ago, we now deliver around six times as much computing power with the same amount of electrical power. Given these initiatives, we mitigate risks through technological improvements or innovations that support the transition to a lower-carbon, energy-efficient economic system.  |
| Legal               | Relevant, sometimes included | We believe that Alphabet's industry—internet services— does not have significant legal risk related to climate change, based on current climate-related litigation. An example of a potential legal risk could be climate-related litigation associated with lack of compliance with environmental regulations. This is considered to be a low risk as we monitor current and emerging regulations to assess risks and ensure compliance. We also pursue many voluntary sustainability certifications that demonstrate that we're going beyond compliance. For example, we pursue and align with voluntary certifications for our operations and products, including the ISO 50001 certified energy management system for select data centers and Leadership in Energy and Environmental Design (LEED) certifications for select offices. We also support greener electronics standards and certifications, including UL 110, IEEE 1680.1, and the Electronic Product Environmental Assessment Tool (EPEAT). In February 2017, the Nest Learning Thermostat became the first smart thermostat to achieve ENERGY STAR certification by the EPA. Our other products with ENERGY STAR certification include Pixelbook Go, Nest Thermostat E, and the new Nest Thermostat. Google also supports public policies that strengthen global climate action efforts through the UNFCCC Conference of Parties (COP), G20, and other multilateral forums, as well as policies that establish emissions-reduction targets and technology-neutral pathways to achieve a carbon-free economy in line with the IPCC guidance and scientific consensus. We also support policies that ensure the clean energy economy provides economic growth for all, spurs a new generation of green jobs, benefits the communities most impacted by a changing climate, and leaves no one behind in the transition. |
| Market              | Relevant, sometimes included | In 2019, the National Bureau of Economic Research published a study on the long-term macroeconomic effects of climate change, which found that increases in average global temperatures could result in GDP per capita declines of up to 10.5% for the United States and 4.6% for the European Union by 2100 due to changes in labor productivity, among other factors. Throughout 2020, climate-related events including devastating floods, extreme droughts, and wildfires, impacted communities and caused economic disruptions around the world. Fluctuating socio-economic conditions due to climate change could have a negative impact on Google's revenue if they cause users to reduce the rate of economic transactions and thus cause advertisers to demand less online advertising. Alphabet generated over 80% (more than \$146,000,000,000) of total revenues from the display of ads online in 2020. If, for example, all online economic activity decreased by 1%, it is hypothetically possible that we could experience a similar reduction in our share of this activity.  |
| Reputation          | Relevant, sometimes included | Insufficiently addressing climate change risks and impacts could result in reduced demand for our goods and services because of negative reputation impact. The 2020 Best Global Brands report, produced independently by Interbrand, ranks Google as the fourth most valuable global brand. Negative reputation could result in a decrease in brand value and in a loss of future brand equity. This risk driver could have a negative impact on our brands. For example, Interbrand's 2020 Best Global Brands report estimates Google's brand value at approximately \$165 billion. Using Interbrand's estimated brand value, a hypothetical reputational risk resulting in a 0.1% decrease in brand value could result in a loss of future brand equity of approximately \$165 million. It is very difficult to predict the magnitude or potential occurrence of this risk, given the indirect nature of the relationship between climate change and online consumer economic activity.   |
| Acute physical      | Relevant, sometimes included | In 2017, we conducted an assessment of Google's exposure to climate risk in the near-term (2020-2025), mid-term (2050), and long-term (2100). This included a global assessment of the impact of sea level rise, precipitation (flooding), precipitation (drought), temperature and water stress on our real estate operations. Based on this assessment, we found our biggest risk to be flooding at our Bay Area headquarters. In 2020, we conducted an updated global assessment of near-term (2030) and mid-term (2050) climate risks, including the impacts of flooding, extreme heat and water stress, as well as a special focus on wildfires in applicable locations. Based on this updated assessment, we found exposure to flooding and extreme heat across the portfolio to be our biggest risks. Our 2017 assessment suggested that these trends are likely to increase and continue through the end of the century.   |
| Chronic physical    | Relevant, sometimes included | We must cool our data centers to keep them in operation, and the amount of energy needed to cool them is related to the outside air temperature. If global temperatures increase, this will increase the amount of energy required to cool our data centers and increase the cost of running our operations. Given that climate change is expected to increase average temperatures globally and we have facilities and operations around the world, this is a risk that we face at all of our facilities globally. In particular, this may impact our data centers located in warm climates, such as our data center in Singapore. As of December 31, 2020, Google had 23 data center locations across North America, South America, Europe, and Asia. To learn more about our data centers and their locations, see: <a href="https://www.google.com/about/datacenters/locations/">https://www.google.com/about/datacenters/locations/</a> In general, we expect that our data center cooling costs will go up proportionately to the increase in cooling-degree-days due to increasing average temperatures. We are not able to predict the exact temperature increase, but if, for example, the number of cooling-degree-days increased by 10%, we would expect a 10% rise in our cooling costs, assuming we were not further able to improve our energy efficiency. This would have a low-to-medium negative financial impact. In 2020, Google conducted an updated climate risk assessment, building on the previous risk assessment that was conducted in 2017. This included climate scenario analysis, referencing RCP 4.5 and 8.5, and an assessment of the impact of flooding, water stress, extreme heat and wildfires on 26 priority office sites and 23 data center locations.   |

**C2.3**

**(C2.3) Have you identified any inherent climate-related risks with the potential to have a substantive financial or strategic impact on your business?**

Yes

**C2.3a**

**(C2.3a) Provide details of risks identified with the potential to have a substantive financial or strategic impact on your business.**

**Identifier**

Risk 1

**Where in the value chain does the risk driver occur?**

Direct operations

**Risk type & Primary climate-related risk driver**

|                     |  |
|---------------------|--|
| Emerging regulation | Other, please specify (Policy and legal: Increased pricing of GHG emissions) |
|---------------------|--|

**Primary potential financial impact**

Increased indirect (operating) costs

**Climate risk type mapped to traditional financial services industry risk classification**

<Not Applicable>

**Company-specific description**

We have few direct emissions of greenhouse gases, therefore we do not expect our operations to be directly impacted by climate policy in the US, nor do we expect to participate in any current or future compliance markets for carbon trading in the US. Running our business requires us to use a lot of electricity to power our data centers, offices, and other infrastructure. We have offices across more than 180 cities primarily across North America, Europe, South America, and Asia, and we have 23 data center locations, as well as more than 20 Google Cloud regions. In 2020, our total energy consumption was 15,439,538 MWh. Therefore, Google does face the risk of increased costs of energy if a price on carbon is applied through legislation such as cap and trade (or other mechanisms such as taxation).

**Time horizon**

Short-term

**Likelihood**

Unlikely

**Magnitude of impact**

Low

**Are you able to provide a potential financial impact figure?**

Yes, a single figure estimate

**Potential financial impact figure (currency)**

18000000

**Potential financial impact figure – minimum (currency)**

<Not Applicable>

**Potential financial impact figure – maximum (currency)**

<Not Applicable>

**Explanation of financial impact figure**

As a hypothetical example, if a carbon price of e.g. \$19/metric tonne were established through regulation (median price of carbon/tonne from the May 2021 CA-QC Joint Auction), this could increase our costs by approximately \$18 million, assuming these costs were passed through to electricity consumers and we were not further able to reduce our carbon footprint. This was calculated by adding our 2020 Scope 1 and 2020 Scope 2 market-based emissions, and then multiplying by the aforementioned carbon price example [= (2020 Scope 1 + market-based Scope 2) x \$19]. The financial impact would likely be less as we already voluntarily purchase carbon offsets. Note that this is a hypothetical example and not our actual internal carbon price.

**Cost of response to risk**

0

**Description of response and explanation of cost calculation**

As an example of a case study, while the regulatory risk to our business is small, we are minimizing our exposure to this risk by working to run the most efficient computing infrastructure in the world. Through efficiency innovations, we have managed to cut energy usage in our data centers so that we're using significantly less energy than the industry average. As a result, in 2020, Google's data centers that reached our operational thresholds for reporting achieved an average PUE (power usage effectiveness) of 1.10, compared with the industry average of 1.59. We achieved this through the use of increasingly efficient power supplies, evaporative cooling technology, machine learning and other innovations. An additional risk mitigation activity is our work to procure renewable energy for our operations via long-term contracts with stable prices. In 2019, we announced a 1.6 GW package of agreements that represents our biggest commitment ever to purchase renewable energy—and the largest such announcement made by any corporation at the time. By the end of 2020, Google had signed more than 55 renewable energy agreements, which will provide nearly 6 GW of renewable energy. Though there is an up-front capital cost associated with our data center efficiency improvements, these projects have financial paybacks because they improve our energy efficiency and thus reduce our operational costs. From a net point of view, these improvements therefore come at zero net cost, so our cost of response to this risk is \$0.

**Comment**

**Identifier**

Risk 2

**Where in the value chain does the risk driver occur?**

Direct operations

**Risk type & Primary climate-related risk driver**

|            |  |
|------------|--|
| Reputation | Increased stakeholder concern or negative stakeholder feedback |
|------------|--|

**Primary potential financial impact**

Decreased revenues due to reduced demand for products and services

**Climate risk type mapped to traditional financial services industry risk classification**

<Not Applicable>

**Company-specific description**

We have always been a company committed to building helpful products that can improve the lives of millions of people. Our product innovations have made our services widely used, and our brand one of the most recognized in the world. Google Services' core products and platforms include Android, Chrome, Gmail, Google Drive, Google Maps, Google Photos, Google Play, Search, and YouTube, each with broad and growing adoption by users around the world. Google Cloud includes Google's infrastructure and data analytics platforms, collaboration tools, and other services for enterprise customers. Insufficiently addressing potential climate change risks and impacts could result in reduced demand for our goods and services due to negative reputation impact associated with limited transparency, among other factors. We discuss these risks and impacts and share how we're addressing them through our sustainability initiatives in our public disclosures, such as Alphabet's CDP Climate Change response and Google's Environmental Report, and via our website, sustainability.google. As an example, in Google's Environmental Report, we discuss the risks associated with global challenges such as climate change and extreme weather events, and share more details about how we're working to find new ways for technology to be helpful at the most critical times, through services such as flood forecasting, wildfire mapping, and earthquake detection. Through white papers, case studies, and blog posts, we work to establish transparency and share best practices to help others do the same. The 2020 Best Global Brands report, produced independently by Interbrand, ranks Google as the fourth most valuable global brand, valued at approximately \$165 billion. Negative reputation could result in a decrease in brand value and in a loss of future brand equity.

**Time horizon**

Medium-term

**Likelihood**

About as likely as not

**Magnitude of impact**

Medium

**Are you able to provide a potential financial impact figure?**

Yes, a single figure estimate

**Potential financial impact figure (currency)**

165000000

**Potential financial impact figure – minimum (currency)**

&lt;Not Applicable&gt;

**Potential financial impact figure – maximum (currency)**

&lt;Not Applicable&gt;

**Explanation of financial impact figure**

This risk driver could have a negative impact on our brands. For example, the 2020 Best Global Brands report, produced independently by Interbrand, estimates Google's brand value at approximately \$165 billion. Using Interbrand's estimated brand value, a hypothetical reputational risk resulting in a 0.1% decrease in brand value could result in a loss of future brand equity of approximately \$165 million. It is very difficult to predict the magnitude or potential occurrence of this risk, given the indirect nature of the relationship between climate change and online consumer economic activity.

**Cost of response to risk**

14000000

**Description of response and explanation of cost calculation**

We continually strive to increase efficiency and reduce our impact on the environment, thereby helping our customers reduce their footprint as well by choosing our products and services. For example, people are saving time and money with Google Maps, all while minimizing their environmental impact. Google also works to accelerate the development of renewable energy (RE) by procuring RE for our operations and through RE investments. For over 10 years, we've been building and running some of the most efficient data centers in the world. All these efforts can have positive impacts on our reputation and potentially increase demand for Google's products and services. As an example of a case study, to increase transparency, build awareness of our sustainability initiatives, and help others looking to implement similar initiatives, we share our best practices through Google's Environmental Report, as well as through white papers and blog posts on sustainability.google. In 2019, we published a case study on accelerating RE purchasing through auctions, where we shared details about how our RE auction worked and the lessons we learned along the way in the lead up to our 2019 announcement of making the biggest corporate purchase of renewable energy in history at the time. We have also published a white paper that provides a detailed overview of our current carbon-free energy framework and methodology. As a result, we hope that these resources help other companies and consumers envision how they too can set goals to move closer to 24/7 carbon-free energy and maximize their impact on grid decarbonization. Google has various significant longstanding and ongoing investments in sustainability, some of which have been announced publicly, while other investments remain confidential. In addition to these investments, one of the costs associated with properly addressing climate change opportunities and impacts is the staff time to manage key initiatives on sustainability, energy efficiency, and renewable energy. As a rough estimate, this may be estimated to be approximately \$14 million per year. This was calculated by multiplying the median employee total compensation for the year ended December 31, 2020 by the estimated number of full-time employee equivalents that would manage these specific initiatives. This hypothetical cost figure may vary over time and may not be representative of the workload resources currently dedicated to these initiatives.

**Comment****Identifier**

Risk 3

**Where in the value chain does the risk driver occur?**

Direct operations

**Risk type & Primary climate-related risk driver**

|        |                            |
|--------|----------------------------|
| Market | Changing customer behavior |
|--------|----------------------------|

**Primary potential financial impact**

Decreased revenues due to reduced demand for products and services

**Climate risk type mapped to traditional financial services industry risk classification**

&lt;Not Applicable&gt;

**Company-specific description**

Alphabet generated over 80% of total revenues from the display of online ads in 2020. Advertisers pay Google for the ability to advertise via our Google properties (which includes Google Search and other properties and YouTube ads) and Google Network Members' properties. In 2019, the National Bureau of Economic Research published a study on the long-term macroeconomic effects of climate change, which found that increases in average global temperatures could result in GDP per capita declines of up to 10.5% for the United States and 4.6% for the European Union by 2100 due to changes in labor productivity, among other factors. Throughout 2020, climate-related events including devastating floods, extreme droughts, and wildfires, impacted communities and caused economic disruptions around the world. Fluctuating socio-economic conditions due to climate change could have a negative impact on Google's revenue if it causes users to reduce the rate of economic transactions and thus causes advertisers to demand less online advertising.

**Time horizon**

Medium-term

**Likelihood**

Unlikely

**Magnitude of impact**

Medium

**Are you able to provide a potential financial impact figure?**

Yes, a single figure estimate

**Potential financial impact figure (currency)**

146000000

**Potential financial impact figure – minimum (currency)**

<Not Applicable>

**Potential financial impact figure – maximum (currency)**

<Not Applicable>

**Explanation of financial impact figure**

Fluctuating socio-economic conditions could have a negative impact on Google's revenue if they cause users to reduce the rate of economic transactions and thus cause advertisers to demand less online advertising. It is difficult to predict the magnitude of this risk, given the indirect nature of the relationship between climate change and online consumer economic activity. That said, Alphabet generated over 80% (more than \$146,000,000,000) of total revenues from the display of ads online in 2020. If, for example, all online economic activity decreased by 1%, it is hypothetically possible that we could experience a similar reduction in our share of this activity (i.e. \$1,460,000,000).

**Cost of response to risk**

14000000

**Description of response and explanation of cost calculation**

Since avoiding or minimizing climate change would reduce this risk, activities to promote and advocate for clean energy can help to minimize this risk. As an example of a case study, we actively engage with policy makers to support local, regional, national, and international policies to reduce dependence on carbon intensive power and support clean energy deployment. For example, Google engaged in a number of activities to advocate for a strong agreement at the United Nations Framework Convention on Climate Change (UNFCCC) twenty-first annual Conference of the Parties (COP21), which took place from November 30th to December 11th, 2015 in Paris. We continued to engage on clean energy policy in 2019. We participated actively in COP25 in Madrid to support a robust outcome from the conference. As a result, in partnership with the Chilean government, we helped host a virtual Ministerial roundtable with 25 Science Ministers on Google Meet, placed a Google Earth Wall display inside the UNFCCC's official pavilion in the Blue Zone to bring climate change impacts to life, sponsored a reception with Ministerial-level officials from approximately 20 governments, and participated in a variety of panels throughout the COP. We were unable to participate in the annual COP in 2020 because COP-26 was postponed due to the COVID-19 pandemic. However, Google continues to serve as a catalyst for policy change through targeted advocacy at the international, national and state levels. Google has various significant longstanding and ongoing investments in sustainability, some of which have been announced publicly, while other investments remain confidential. In addition to these investments, one of the costs associated with properly addressing climate change opportunities and impacts is the staff time to manage key initiatives on sustainability, energy efficiency, and renewable energy. As a rough estimate, this may be estimated to be approximately \$14 million per year. This was calculated by multiplying the median employee total compensation for the year ended December 31, 2020 by the estimated number of full-time employee equivalents that would manage these specific initiatives. This hypothetical cost figure may vary over time and may not be representative of the workload resources currently dedicated to these initiatives.

**Comment**

**Identifier**

Risk 4

**Where in the value chain does the risk driver occur?**

Direct operations

**Risk type & Primary climate-related risk driver**

|                    |   |
|--------------------|---|
| Current regulation | Other, please specify (Rollback of corporate clean energy procurement policies) |
|--------------------|---|

**Primary potential financial impact**

Increased indirect (operating) costs

**Climate risk type mapped to traditional financial services industry risk classification**

<Not Applicable>

**Company-specific description**

Running our business requires us to use a lot of electricity to power our data centers, offices, and other infrastructure. In 2020, our total energy consumption was 15,439,538 MWh. Our renewable energy contracts provide long-term power cost certainty. The price of renewable energy has decreased significantly since Google entered the renewable energy market 10 years ago and Google has benefitted from this price reduction. In 2020, we launched our third decade of climate action with a new set of audacious commitments: By 2030, we aim to become the first major company to operate on carbon-free energy 24/7. Therefore, Google could face the risk of increased costs to meet its carbon-free energy goals if we have decreased access to procure renewable energy in places where we operate.

**Time horizon**

Short-term

**Likelihood**

More likely than not

**Magnitude of impact**

Medium

**Are you able to provide a potential financial impact figure?**

Yes, a single figure estimate

**Potential financial impact figure (currency)**

0

**Potential financial impact figure – minimum (currency)**

<Not Applicable>

**Potential financial impact figure – maximum (currency)**

<Not Applicable>

**Explanation of financial impact figure**

An elimination of policies that enable corporate end users to purchase clean energy would make it more difficult for Google to meet its carbon-free energy goals by decreasing access to renewable energy in states where we operate. This would mean we would have to find other alternatives to procure carbon-free energy, which could be more expensive or located outside of the grids where we operate. We are unable to make precise estimates for this risk, so we have put \$0 for potential financial impact.

**Cost of response to risk**

14000000

**Description of response and explanation of cost calculation**

We have been working directly with federal and state policymakers, NGOs, and others in industry to provide support for these policies. As an example of a case study, members of Google's energy and public policy teams have engaged directly with policymakers from the U.S. (including the White House, the U.S. Congress and Governors), the European Union, and other countries to call for policies that promote renewable energy and/or reduce carbon emissions. In 2019, this included signing a letter sent by the RE-Source Platform to the European Commission, urging them to prioritize the removal of barriers to corporate renewable energy PPAs in their evaluation of member states' energy plans. As a result, one week after the RE-Source letter was sent, the draft Commission Assessment of these national energy plans was released and it urged member states to introduce specific policies and measures to facilitate the uptake of PPAs. In 2020, we collaborated with other corporate renewable energy buyers and project developers via the RE-Source Platform to develop and advocate a joint policy position to enable Corporate Power Purchase Agreements to play a greater role in delivering the EU Green Deal. We advocated for the RE-Source Platform to play a stronger role on energy policy advocacy, which contributed to the creation of a dedicated policy working group within RE-Source. Google has various significant longstanding and ongoing investments in sustainability, some of which have been announced publicly, while other investments remain confidential. In addition to these investments, one of the costs associated with properly addressing climate change opportunities and impacts is the staff time to manage key initiatives on sustainability, energy efficiency, and renewable energy. As a rough estimate, this may be estimated to be approximately \$14 million per year. This was calculated by multiplying the median employee total compensation for the year ended December 31, 2020 by the estimated number of full-time employee equivalents that would manage these specific initiatives. This hypothetical cost figure may vary over time and may not be representative of the workload resources currently dedicated to these initiatives.

**Comment**

**Identifier**

Risk 5

**Where in the value chain does the risk driver occur?**

Direct operations

**Risk type & Primary climate-related risk driver**

|                |  |
|----------------|--|
| Acute physical | Increased severity and frequency of extreme weather events such as cyclones and floods |
|----------------|--|

**Primary potential financial impact**

Other, please specify (Increased capital costs)

**Climate risk type mapped to traditional financial services industry risk classification**

<Not Applicable>

**Company-specific description**

In 2020, we conducted an updated assessment of Google's exposure to climate risk in the near-term (2030) and mid-term (2050). The study found that, based on RCP 4.5 and 8.5, Google's global portfolio of offices and data centers is likely to experience increased exposure to extreme heat and flooding, including flooding from sea level rise, in both 2030 and 2050. This updated analysis incorporated both absolute risk exposure and business criticality of each location. Some of our high-growth office locations and data center sites are at high risk when mapped against anticipated climate risk factors. For example, many of Google's office buildings in the Bay Area are located in the current 100-year floodplain and, therefore, are at risk to impacts from coastal flooding in the present day. Those risks will only be further exacerbated by sea level rise throughout the century. Coastal flooding, which will be worsened by rising sea levels, could have the following impacts on Google's facilities and operations: 1) Flood impacts to Google's buildings could result in damage to the structure, building equipment, and contents, as well as potential risks to employee safety, 2) Flood impacts to major roadways and other transportation routes may impact the ability of employees to get to work, and 3) On a more global scale, sea level rise and coastal flooding could impact Google's global supply chains and business operations.

**Time horizon**

Long-term

**Likelihood**

Likely

**Magnitude of impact**

Medium

**Are you able to provide a potential financial impact figure?**

Yes, a single figure estimate

**Potential financial impact figure (currency)**

0

**Potential financial impact figure – minimum (currency)**

<Not Applicable>

**Potential financial impact figure – maximum (currency)**

<Not Applicable>

**Explanation of financial impact figure**

We are still analyzing the financial impact of this risk. Among other considerations, we reference the framework established in SEC guidance to help assess substantive financial impact on our business. We consider quantitative and qualitative factors when determining significance with respect to financial reporting and matters related to financial reporting. We are unable to make precise estimates for this risk, so we have put \$0 for potential financial impact.

**Cost of response to risk**

0

**Description of response and explanation of cost calculation**

We are actively evaluating climate risk over multiple time horizons. Water stress, flooding and extreme heat have been identified as climate risks that could have a significant impact on physical assets, and have been considered as part of the overall development strategy. To determine and manage the significance of climate-related risks in relation to other risks, we have evaluated risk from a triple bottom line perspective, including environment, financial and social impacts. As a result, we are addressing risk through a number of ecological approaches. As an example of a case study, when we launched Google's Ecology Program in 2014, our goal was to enhance ecological resilience. We leveraged cutting-edge science and data to create the Landscape Resilience Framework for ecological planning in the region, in partnership with the San Francisco Estuary Institute. We engaged with ecologists, landscape architects, planners, and local nongovernmental organizations to ensure that our outdoor environments would enhance the region's existing ecology over time. Together, we focused on the following objectives: expanding wildlife habitat, creating diverse landscapes that can withstand the stresses of climate change, and restoring many of the ecological functions lost with the development of office parks across Silicon Valley. As a result, Google has planted 1.4 acres of native vegetation in our "Green Loop," added roughly 5.9 acres of riparian habitat and 1,800 native trees to the Charleston Retention Basin, and designed our Bay View site like a bay's edge, with large meadows, emergent and freshwater marsh, and one of the largest willow groves

ever planted in the region. For more information on Google's Urban Ecology program, see: <https://sustainability.google/projects/urban-ecology/> We are unable to make precise estimates for this risk, so we have put \$0 for the cost of response to this risk.

**Comment**

---

**Identifier**

Risk 6

**Where in the value chain does the risk driver occur?**

Direct operations

**Risk type & Primary climate-related risk driver**

|                  |                          |
|------------------|--------------------------|
| Chronic physical | Rising mean temperatures |
|------------------|--------------------------|

**Primary potential financial impact**

Increased indirect (operating) costs

**Climate risk type mapped to traditional financial services industry risk classification**

<Not Applicable>

**Company-specific description**

We must cool our data centers to keep them in operation, and the amount of energy needed to cool them is related to the outside air temperature. If global temperatures increase, this will increase the amount of energy required to cool our data centers and increase the cost of running our operations. Given that climate change is expected to increase average temperatures globally and we have facilities and operations around the world, this is a risk we face at all of our facilities globally. In particular, this may impact our data centers located in warm climates, such as our data center in Singapore. As of December 31, 2020, Google had 23 data center locations across North America, South America, Europe, and Asia. To learn more about our data centers and their locations, see: <https://www.google.com/about/datacenters/inside/locations/>

**Time horizon**

Medium-term

**Likelihood**

Very likely

**Magnitude of impact**

Medium-low

**Are you able to provide a potential financial impact figure?**

Yes, a single figure estimate

**Potential financial impact figure (currency)**

0

**Potential financial impact figure – minimum (currency)**

<Not Applicable>

**Potential financial impact figure – maximum (currency)**

<Not Applicable>

**Explanation of financial impact figure**

In general, we expect that our cooling costs will go up proportionately to the increase in cooling-degree-days due to increasing average temperatures. We are not able to predict the exact temperature increase, but if, for example, the number of cooling-degree-days increased by 10%, we would expect a 10% rise in our cooling costs, assuming we were not further able to improve our energy efficiency. This would have a low-medium negative financial impact. We are unable to make precise estimates for this risk, so we have put \$0 for potential financial impact.

**Cost of response to risk**

0

**Description of response and explanation of cost calculation**

As an example of a case study, while the risk to our business is low-medium, we are minimizing our exposure to this risk (as well as regulatory risk) by working to run the most efficient computing infrastructure in the world. Through efficiency innovations, we've cut energy usage in our data centers so that we're using significantly less energy than the industry average. As a result, in 2020, Google's data centers that reached our operational thresholds for reporting achieved an average PUE (power usage effectiveness) of 1.10, compared with the industry average of 1.59. We achieved this through the use of increasingly efficient power supplies, evaporative cooling technology, machine learning and other innovations. In addition, because our data centers are located around the world, we minimize the risk that an unusually large increase in a particular region's temperature would force us to increase energy use and emissions in the most vulnerable locations or increase our costs disproportionately compared to the average global temperature increase. Though there is an upfront capital cost associated with our data center efficiency (and specifically cooling efficiency) improvements, these projects have financial paybacks because they improve our energy efficiency, reduce our emissions, and reduce our operational costs. From a net point of view, these improvements therefore come at zero net cost, so our cost of response to this risk is \$0.

**Comment**

---

**C2.4**

---

**(C2.4) Have you identified any climate-related opportunities with the potential to have a substantive financial or strategic impact on your business?**

Yes

**C2.4a**

---

**(C2.4a) Provide details of opportunities identified with the potential to have a substantive financial or strategic impact on your business.**

---

**Identifier**

Opp1

**Where in the value chain does the opportunity occur?**

Downstream

**Opportunity type**

Products and services

**Primary climate-related opportunity driver**

Development and/or expansion of low emission goods and services

**Primary potential financial impact**

Increased revenues resulting from increased demand for products and services

**Company-specific description**

Any regulation that imposes a price on carbon or regulates carbon emissions may incentivize customers to switch their technology infrastructure to Google Workspace and take advantage of Google's cloud, which is highly energy efficient and is carbon neutral. This could create additional demand for Google's existing products and/or services. An example of one such regulation that could impact our operations is the European Emissions Trading System (EU ETS) that regulates carbon emissions across several sectors of the European Economy. Google has six data centers in Europe. If a change in regulation under the EU ETS results in increased power prices for those purchasing higher-carbon electricity, then it may make switching to Google's carbon neutral Cloud more attractive.

**Time horizon**

Short-term

**Likelihood**

About as likely as not

**Magnitude of impact**

Low

**Are you able to provide a potential financial impact figure?**

Yes, a single figure estimate

**Potential financial impact figure (currency)**

182500000

**Potential financial impact figure – minimum (currency)**

&lt;Not Applicable&gt;

**Potential financial impact figure – maximum (currency)**

&lt;Not Applicable&gt;

**Explanation of financial impact figure**

If new carbon regulations are implemented, Google is in a position to grow its products and services as a Google data center is, on average, twice as energy efficient as a typical enterprise data center. For illustrative purposes, if a new energy efficiency regulation resulted in a hypothetical regulatory advantage for Google and yielded an unpredictable 0.1% increase in revenue, it is hypothetically possible that we could experience a similar increase in annual revenue. Based on our FY2020 revenue of \$182.5 billion, 0.1% would equate to approximately \$182.5 million.

**Cost to realize opportunity**

14000000

**Strategy to realize opportunity and explanation of cost calculation**

We've worked hard to minimize the environmental impact of our products and services and we continue to find new ways to reduce our impacts even further. Our data centers are some of the most efficient in the world. On average, a Google data center is twice as energy efficient as a typical enterprise data center. Providing an active user with one month of Google services creates fewer GHG emissions than driving a car one mile—and these emissions are neutralized as part of our operational carbon neutrality commitment. In 2013, we became the first company in North America—and the only major internet company—to achieve a multi-site energy management system certification to ISO 50001. As of 2020, we have maintained our ISO 50001 certification for our operational European data centers. As an example of a case study, we're working to support transition of the world's power to more renewables like wind and solar. By the end of 2020, we had signed more than 55 agreements totaling nearly 6 GW of renewable energy. We're also working with our utility partners to find solutions that will make more renewable energy available for us and for others. As a result, we're making our products and services more efficient and matching our electricity use with renewable energy. In 2020, we committed to aim to operate on carbon-free energy 24/7 by 2030 and to enable 5 gigawatts of new carbon-free energy across our key manufacturing regions through investment. Google has various significant longstanding and ongoing investments in sustainability, some of which have been announced publicly, while other investments remain confidential. In addition to these investments, one of the costs associated with properly addressing climate change opportunities and impacts is the staff time to manage key initiatives on sustainability, energy efficiency, and renewable energy. As a rough estimate, this may be estimated to be approximately \$14 million per year. This was calculated by multiplying the median employee total compensation for the year ended December 31, 2020 by the estimated number of full-time employee equivalents that would manage these specific initiatives. This hypothetical cost figure may vary over time and may not be representative of the workload resources currently dedicated to these initiatives.

**Comment****Identifier**

Opp2

**Where in the value chain does the opportunity occur?**

Downstream

**Opportunity type**

Products and services

**Primary climate-related opportunity driver**

Development and/or expansion of low emission goods and services

**Primary potential financial impact**

Increased revenues resulting from increased demand for products and services

**Company-specific description**

We have always been a company committed to building helpful products that can improve the lives of millions of people. Our product innovations have made our services widely used, and our brand one of the most recognized in the world. Google Services' core products and platforms include Android, Chrome, Gmail, Google Drive, Google

Maps, Google Photos, Google Play, Search, and YouTube, each with broad and growing adoption by users around the world. Google Cloud includes Google's infrastructure and data analytics platforms, collaboration tools, and other services for enterprise customers. Addressing climate change opportunities head on could result in an increased demand for our goods and services by positively impacting our reputation. We own and lease additional office and building space, research and development labs, and sales and support offices across more than 180 cities primarily in North America, Europe, South America, and Asia, and we have 23 data center locations across four continents. In 2020, we matched 100% of our global electricity use with purchases of renewable energy for the fourth year in a row, which could positively impact our reputation in regions where we operate.

**Time horizon**

Medium-term

**Likelihood**

About as likely as not

**Magnitude of impact**

Medium

**Are you able to provide a potential financial impact figure?**

Yes, a single figure estimate

**Potential financial impact figure (currency)**

165000000

**Potential financial impact figure – minimum (currency)**

<Not Applicable>

**Potential financial impact figure – maximum (currency)**

<Not Applicable>

**Explanation of financial impact figure**

This opportunity driver could have a positive impact on our brands. For example, the 2020 Best Global Brands report, produced independently by Interbrand, estimates Google's brand value at approximately \$165 billion. Using Interbrand's estimated brand value, a hypothetical increase in brand value of 0.1% could result in a gain of future brand equity of approximately \$165 million. It is very difficult to predict the magnitude or potential occurrence of this opportunity, given the indirect nature of the relationship between climate change and online consumer economic activity.

**Cost to realize opportunity**

14000000

**Strategy to realize opportunity and explanation of cost calculation**

We strive to make our processes more efficient and reduce our impact on the environment, thereby helping our customers reduce their footprints as well by choosing our products and services. As an example of a case study, as demand increases for information about alternative transportation options, there may be more users of Google Maps and Google Transit. Therefore, we continue to add new features and cities to Google Maps to help people better understand and reduce their personal environmental impact. Google Maps has transit information for more than 12,000 agencies, running through more than 4.6 million transit stations, in over 110 countries. As a result, Google Maps provides, on average, more than 1 billion km worth of transit results every day. As another example, Google works to accelerate the development of renewable energy by procuring renewable energy for our operations and through renewable energy investments; to promote electricity market reforms that unlock access to carbon-free power around the world; and to build and run some of the most efficient data centers in the world. As a result, all these efforts can have positive impacts on our reputation and potentially increase demand for Google's products and services. In 2020, we committed to aim to operate on carbon-free energy 24/7 by 2030 and to enable 5 gigawatts of new carbon-free energy across our key manufacturing regions through investment. Google has various significant longstanding and ongoing investments in sustainability, some of which have been announced publicly, while other investments remain confidential. In addition to these investments, one of the costs associated with properly addressing climate change opportunities and impacts is the staff time to manage key initiatives on sustainability, energy efficiency, and renewable energy. As a rough estimate, this may be estimated to be approximately \$14 million per year. This was calculated by multiplying the median employee total compensation for the year ended December 31, 2020 by the estimated number of full-time employee equivalents that would manage these specific initiatives. This hypothetical cost figure may vary over time and may not be representative of the workload resources currently dedicated to these initiatives.

**Comment**

---

**Identifier**

Opp3

**Where in the value chain does the opportunity occur?**

Downstream

**Opportunity type**

Products and services

**Primary climate-related opportunity driver**

Development of new products or services through R&D and innovation

**Primary potential financial impact**

Increased revenues resulting from increased demand for products and services

**Company-specific description**

In 2020, we set a goal to offer 1 billion people new ways to live more sustainably via our core products by 2022. We're building products and tools that empower billions of people to better understand and reduce their personal environmental impact, help drive carbon mitigation efforts, and inform climate science. We see an opportunity to help raise awareness about the physical changes to the Earth's natural resources and climate through Google Earth and other products, resulting in wide social benefits. Google has developed Google Earth Engine (earthengine.google.com), a planetary scale platform for geospatial data analysis that brings together the world's environmental and Earth observation satellite imagery, and makes it available for analysis online globally. Also, Google created the Earth Outreach program, which gives non profits and organizations the knowledge and resources they need to visualize their causes and share their story with hundreds of millions of users. As a global platform, Earth Engine can help to analyze data and information from around the world. The wider social benefits created by Google Earth may result in increased brand loyalty for Google.

**Time horizon**

Short-term

**Likelihood**

Virtually certain

**Magnitude of impact**

Medium



**Are you able to provide a potential financial impact figure?**

Yes, a single figure estimate

**Potential financial impact figure (currency)**

165000000

**Potential financial impact figure – minimum (currency)**

<Not Applicable>

**Potential financial impact figure – maximum (currency)**

<Not Applicable>

**Explanation of financial impact figure**

To date, Google Earth Engine has primarily been a philanthropic project, but this could change as the product evolves. If customers value Google Earth Engine as a tool to examine the physical changes to the Earth's natural resources and climate, this could result in increased customer loyalty or brand value. This opportunity driver could have a positive impact on our brands. For example, the 2020 Best Global Brands report, produced independently by Interbrand, estimates Google's brand value at approximately \$165 billion. Using Interbrand's estimated brand value, a hypothetical increase in brand value of 0.1% could result in a gain of future brand equity of approximately \$165 million via brand loyalty created by wider social benefits.

**Cost to realize opportunity**

0

**Strategy to realize opportunity and explanation of cost calculation**

Google Earth Engine was developed to bring together the world's satellite imagery and make it available online with tools for scientists, independent researchers, and nations. Earth Engine has enabled tens of thousands of active users around the world to easily analyze over 25 petabytes of freely available geospatial information, resulting in a deeper understanding of the planet. Using this technology platform, we're helping scientists develop applications for detecting deforestation and mapping land use trends, and have started working with individual countries to develop their own applications. As an example of a case study, in 2018, Google launched the Environmental Insights Explorer (EIE)—an online tool that uses exclusive data sources and modeling capabilities in a freely available platform to help cities measure emission sources, run analyses, and identify strategies to reduce emissions. EIE has published data for more than 200 global cities, and processed climate-relevant data across a sample of 3,000 cities to produce emissions insights from approximately 95 million buildings and nearly 3 trillion km traveled to support local climate action planning. As a result, we've empowered city planners and policymakers with EIE to make it easier for cities to measure progress against their climate action plans. The cities of Hamburg, Germany; Hartford, Connecticut, United States; Kyoto, Japan; and Melbourne, Australia, are just a few leading examples of how access to innovative data sources for measuring and tracking impacts of GHG emissions helps cities act in a timely, effective way. In 2020, we committed to helping more than 500 cities and local governments reduce an aggregate of 1 gigaton of carbon emissions per year by 2030, using EIE to support local climate action planning. In addition to Google's significant longstanding and ongoing investments in sustainability, some of the costs associated with our Earth Engine efforts are staff time to manage software development as well as data storage and processing (i.e. running scientific algorithms) in our data centers. These costs are confidential, so we have put \$0 for cost of management.

**Comment****Identifier**

Opp4

**Where in the value chain does the opportunity occur?**

Downstream

**Opportunity type**

Energy source

**Primary climate-related opportunity driver**

Shift toward decentralized energy generation

**Primary potential financial impact**

Returns on investment in low-emission technology

**Company-specific description**

With the rising need for energy, we expect renewable energy to play an integral part in the world's energy infrastructure. Along with being the world's largest annual corporate purchaser of renewable energy, Google is also one of the largest corporate investors in renewable energy. From 2010 to 2020, Google made commitments to invest nearly \$3.3 billion in renewable energy projects with an expected combined capacity of approximately 8.7 GW. By being an early investor and deploying smart capital to fund utility-scale projects, we have helped accelerate the deployment of the latest clean energy technologies and provided more capital for developers to build additional renewable projects while also generating attractive risk-adjusted returns for Google. This is a global opportunity as there are renewable energy opportunities worldwide, across different geographies and technology types. We've invested in large scale renewable energy projects, as well as in funds that help to deploy solar PV panels on residential homes, where the falling costs of solar PV has made distributed generation much more economic.

**Time horizon**

Short-term

**Likelihood**

Very likely

**Magnitude of impact**

Medium

**Are you able to provide a potential financial impact figure?**

Yes, a single figure estimate

**Potential financial impact figure (currency)**

0

**Potential financial impact figure – minimum (currency)**

<Not Applicable>

**Potential financial impact figure – maximum (currency)**

<Not Applicable>

**Explanation of financial impact figure**

The International Energy Agency published a roadmap for the global energy sector in 2021, which estimates that to reach net zero emissions across the global economy by 2050, annual clean energy investment worldwide will need to more than triple by 2030 to around \$4 trillion. This presents a tremendous business opportunity for the private

sector to help build a clean energy future while making attractive risk adjusted returns. In pursuing this opportunity, from 2010 to 2020, Google made commitments to invest nearly \$3.3 billion in renewable energy projects with an expected combined capacity of approximately 8.7 GW. These targeted investments are beyond our own operational footprint and are expected to result in more than \$15 billion of investment in renewable energy projects when including capital invested by partners (both equity and debt). We will continue to manage our existing investments. Our ROI is confidential, so we have put \$0 for financial impact.

#### Cost to realize opportunity

14000000

#### Strategy to realize opportunity and explanation of cost calculation

As an example of a case study, in 2010, Google began investing in a clean energy future to help scale renewable energy solutions to meet society's long-term energy needs and to green electrical grids worldwide. From 2010 to 2020, Google has made commitments to invest nearly \$3.3 billion in renewable energy projects with an expected total combined capacity of approximately 8.7 GW (separate from the PPAs we use to purchase renewable energy for our own operations). These investments help deploy renewable energy at scale while also earning an attractive risk-adjusted return. In 2020, we made the commitment to invest in and help deploy 5 GW of new clean energy by 2030 in our key supply chain regions (which includes our previous commitments of renewable energy in our key manufacturing regions), bringing our combined commitments to 8.7 GW. As a result, once online, this 5 GW supply chain commitment is expected to avoid global emissions equivalent to taking more than 1 million cars off the road each year and catalyze the additional investment of more than \$5 billion in new wind, solar, and other clean energy technologies. Google has various significant longstanding and ongoing investments in sustainability, some of which have been announced publicly, while other investments remain confidential. In addition to these investments, one of the costs associated with properly addressing climate change opportunities and impacts is the staff time to manage key initiatives on sustainability, energy efficiency, and renewable energy. As a rough estimate, this may be estimated to be approximately \$14 million per year. This was calculated by multiplying the median employee total compensation for the year ended December 31, 2020 by the estimated number of full-time employee equivalents that would manage these specific initiatives. This hypothetical cost figure may vary over time and may not be representative of the workload resources currently dedicated to these initiatives.

#### Comment

---

#### Identifier

Opp5

#### Where in the value chain does the opportunity occur?

Downstream

#### Opportunity type

Energy source

#### Primary climate-related opportunity driver

Use of lower-emission sources of energy

#### Primary potential financial impact

Returns on investment in low-emission technology

#### Company-specific description

Future regulatory systems that put a price on carbon could increase the amount of renewable power that states are incentivized or required to procure. Both of these are likely to provide great economic opportunity for efforts to develop and invest in renewable power, as well as to draw more attention to this important issue. Along with being the world's largest annual corporate purchaser of renewable energy, Google is also one of the largest corporate investors in renewable energy. From 2010 to 2020, Google made commitments to invest nearly \$3.3 billion in renewable energy projects with an expected combined capacity of approximately 8.7 GW. These investments help deploy renewable energy at scale while also earning an attractive risk-adjusted return.

#### Time horizon

Short-term

#### Likelihood

About as likely as not

#### Magnitude of impact

Medium-high

#### Are you able to provide a potential financial impact figure?

Yes, a single figure estimate

#### Potential financial impact figure (currency)

0

#### Potential financial impact figure – minimum (currency)

<Not Applicable>

#### Potential financial impact figure – maximum (currency)

<Not Applicable>

#### Explanation of financial impact figure

The International Energy Agency published a roadmap for the global energy sector in 2021, which estimates that to reach net zero emissions across the global economy by 2050, annual clean energy investment worldwide will need to more than triple by 2030 to around \$4 trillion. This presents a tremendous business opportunity for the private sector to help build a clean energy future while making attractive risk adjusted returns. In pursuing this opportunity, from 2010 to 2020, Google made commitments to invest nearly \$3.3 billion in renewable energy projects with an expected combined capacity of approximately 8.7 GW (separate from the PPAs we use to purchase renewable energy for our own operations). Our returns on investment are confidential, so we have put \$0 for potential financial impact.

#### Cost to realize opportunity

14000000

#### Strategy to realize opportunity and explanation of cost calculation

Google employs investment professionals to conduct due diligence and oversee investments in renewable energy projects. We also engage external consultants for financial and technical due diligence. As an example of a case study, in 2010, Google began investing in a clean energy future to help scale renewable energy solutions to meet society's long-term energy needs and to green electrical grids worldwide. From 2010 to 2020, Google has made commitments to invest nearly \$3.3 billion in renewable energy projects with an expected total combined capacity of approximately 8.7 GW (separate from the PPAs we use to purchase renewable energy for our own operations). These investments help deploy renewable energy at scale while also earning an attractive risk-adjusted return. In 2020, we made the commitment to invest in and help deploy 5 GW of new clean energy by 2030 in our key supply chain regions (which includes our previous commitments of renewable energy in our key manufacturing regions), bringing our combined commitments to 8.7 GW. As a result, once online, this 5 GW supply chain commitment is expected to avoid global emissions equivalent to taking more than 1 million cars off the road each year and catalyze the additional investment of more than \$5 billion in new wind, solar, and other clean energy technologies. Google has various significant longstanding and ongoing investments in sustainability, some of which have been announced publicly, while other investments

remain confidential. In addition to these investments, one of the costs associated with properly addressing climate change opportunities and impacts is the staff time to manage key initiatives on sustainability, energy efficiency, and renewable energy. As a rough estimate, this may be estimated to be approximately \$14 million per year. This was calculated by multiplying the median employee total compensation for the year ended December 31, 2020 by the estimated number of full-time employee equivalents that would manage these specific initiatives. This hypothetical cost figure may vary over time and may not be representative of the workload resources currently dedicated to these initiatives.

#### Comment

---

#### Identifier

Opp6

#### Where in the value chain does the opportunity occur?

Downstream

#### Opportunity type

Products and services

#### Primary climate-related opportunity driver

Development and/or expansion of low emission goods and services

#### Primary potential financial impact

Increased revenues resulting from increased demand for products and services

#### Company-specific description

As climate change occurs, energy prices may increase and hence, more consumers may use public and alternative transportation rather than private vehicles. Therefore, there is an opportunity for increased use of Google Maps Transit, which provides public transit directions and walking and biking routes in Google Maps. As can be seen at [www.google.com/transit](http://www.google.com/transit), Google Maps Transit provides maps and schedules for public transit systems in cities worldwide. Google Maps has transit information for more than 12,000 agencies, running through more than 4.6 million transit stations, in over 110 countries. On average, Google Maps provides more than 1 billion km worth of transit results every day.

#### Time horizon

Short-term

#### Likelihood

Very likely

#### Magnitude of impact

Medium-low

#### Are you able to provide a potential financial impact figure?

Yes, a single figure estimate

#### Potential financial impact figure (currency)

165000000

#### Potential financial impact figure – minimum (currency)

<Not Applicable>

#### Potential financial impact figure – maximum (currency)

<Not Applicable>

#### Explanation of financial impact figure

Google Transit and biking/walking routes are a feature of Google Maps, a free online tool that helps people as they navigate, explore and get things done in the world. As demand increases for information about alternative transportation options, we expect that there will be more users of Google Maps. This opportunity driver could have a positive impact on our brands. For example, the 2020 Best Global Brands report, produced independently by Interbrand, estimates Google's brand value at approximately \$165 billion. Using Interbrand's estimated brand value, a hypothetical increase in brand value of 0.1% could result in a gain of future brand equity of approximately \$165 million via brand loyalty created by access to helpful tools.

#### Cost to realize opportunity

0

#### Strategy to realize opportunity and explanation of cost calculation

Transit on Google Maps is a public transportation planning tool that combines the latest agency data with the power of Google Maps, and we are continually improving this tool. For agencies around the world, Google Maps is a cost-effective solution targeted at transit novices and seasoned travelers alike. Google Maps is available in different languages and it is compatible with screen readers for the visually impaired. We've made the Transit and Cycling Directions features on Google Maps available in many countries around the world. As an example of a case study, as demand increases for information about alternative transportation options, there may be more users of Google Maps and Google Transit. Therefore, we continue to add new features and cities to Google Maps to help people better understand and reduce their personal environmental impact. Google Maps has transit information for more than 12,000 agencies, running through more than 4.6 million transit stations, in over 110 countries. As a result, Google Maps provides, on average, over 1 billion km worth of transit results every day. People can save time and money with Google Maps—getting where they need to be, while minimizing their impact on the environment. We're also enabling users to search for information about electric vehicle charging stations, view live traffic delays for buses, public transit crowdedness predictions, bikeshare information, scooter availability, and first- or last-mile transit directions paired with biking and ridesharing. For more information about how we're helping users minimize their impact on the environment, see our blog posts about transit options, real-time bikeshare information, and EV charging stations on Google Maps: - <https://blog.google/products/maps/hop-on-boardand-go-almost-anywherewith/> - <https://blog.google/products/maps/travel-your-first-and-last-mile-google-maps/> - <https://www.blog.google/products/maps/real-time-bikeshare-information-google-map/> - <https://www.blog.google/products/maps/finding-place-charge-your-ev-easy-google-maps/> In addition to Google's significant longstanding and ongoing investments in sustainability, some of the costs associated with our Google Transit efforts and Google Maps features are the team's staff time on engineering, product management, partner management, and software development. These costs are confidential, so we have put \$0 for cost of management.

#### Comment

---

### C3. Business Strategy

---

C3.1

**(C3.1) Have climate-related risks and opportunities influenced your organization's strategy and/or financial planning?**

Yes, and we have developed a low-carbon transition plan

C3.1a

**(C3.1a) Is your organization's low-carbon transition plan a scheduled resolution item at Annual General Meetings (AGMs)?**

|       | Is your low-carbon transition plan a scheduled resolution item at AGMs?                     | Comment  |
|-------|---|--|
| Row 1 | No, and we do not intend it to become a scheduled resolution item within the next two years | Details about our climate-related initiatives and strategy, which are part of our low-carbon transition plan, have been presented at past Annual Meetings of Stockholders. As an example, our sustainability efforts were highlighted in detail at the 2021 Annual Meeting of Stockholders. Google's Sustainability Officer presented on three key ways that we're working towards creating a carbon-free future for all: Leading at Google, supporting partners, and building sustainability into our core products. In addition, our CEO answered stockholder questions regarding sustainability during the Q&A portion of the Annual Meeting. |

C3.2

**(C3.2) Does your organization use climate-related scenario analysis to inform its strategy?**

Yes, qualitative and quantitative

C3.2a

**(C3.2a) Provide details of your organization's use of climate-related scenario analysis.**

| Climate-related scenarios and models applied | Details   |
|--|---|
| RCP 4.5<br>RCP 8.5                           | In 2017, we established Google's climate baseline by assessing future changes to the following climate factors as a result of climate change: sea level rise, precipitation, temperature, and water stress. We used WRI's definitions of water stress and high-stress/extremely high-stress areas. Each of these climate factors were assessed against two emissions pathways and across three time horizons. As a means to capture a short-term, mid-term, and long-term understanding of Google's future climate exposure, three time horizons were identified and considered: 2020/2025, 2050, and 2100. These time horizons were chosen as they correlate with Google's intentions to plan for resilience of its data centers and office buildings, while also providing information about immediate actions needed to improve resilience of its business operations. For each of these time horizons, we conducted an analysis of the Paris-compliant scenario and the business as usual scenario to understand the range of possible future climate impacts. The emissions scenarios were based on the representative concentration pathways (RCPs) developed by the Intergovernmental Panel on Climate Change as part of its Fifth Assessment Report. RCP8.5, the high-emissions pathway, approximates a "business as usual" scenario if there is no significant global action toward GHG emissions reduction and mitigation. The low-emissions scenario, RCP4.5, was chosen because it takes into account significant mitigation efforts and aligns with the Paris climate accord that went into effect in November 2016. As an example of a case study, based on this climate baseline data, we identified the climate exposure for each of Google's sites that were included in this assessment and developed high-level recommendations and priorities to help shape Google's next steps toward a climate resilience strategy. In collaboration with external consultants and other key stakeholders, our GSO led development of a climate resilience strategy for Google, including a global assessment of the impacts of sea level rise, precipitation, temperature and water stress on our major real estate operations (our top 23 sites by headcount) and 15 data center sites. The two key results of the scenario analysis were: exposure to increased temperatures is likely to impact many of our global sites and combined effects of sea level rise and flooding could be significant in our San Francisco Bay Area headquarters, both as early as 2050. As a result, the scenario analysis has primarily informed our real estate development objectives and strategy in the Bay Area, including our campuses in Mountain View and Sunnyvale, California. In an effort to address this risk, through Google's Urban Ecology Program, we've planted 1.4 acres of native vegetation in our "Green Loop" and added roughly 5.9 acres of riparian habitat and 1,800 native trees to the Charleston Retention Basin. Climate resilience is a central theme that influences our large-scale district and master planning. In terms of business objectives, the results of the scenario analysis encouraged Google to take a longer term view on how risks will impact real estate strategy beyond the 2050 time horizon. In terms of strategy, Google is exploring specific ways to invest in mitigation measures today that will reduce future risk, such as expanding creek channels and raising finished floor elevation of new buildings. We're also engaging in public/private partnerships to advance climate resilience solutions at the regional scale. In 2020, Google conducted an updated climate risk assessment, referencing RCP 4.5 and 8.5, which included climate scenario analysis assessment of the impact of flooding, water stress, extreme heat and wildfires on 26 priority office sites and 23 data center locations. Based on this analysis, increased exposure to extreme heat and flooding is likely to impact many of our global offices and data centers as early as 2030. |

C3.3

**(C3.3) Describe where and how climate-related risks and opportunities have influenced your strategy.**

|                                 | Have climate-related risks and opportunities influenced your strategy in this area? | Description of influence  |
|---------------------------------|---|---|
| Products and services           | Yes   | <p>Since our founding, we've focused on providing the best user experience possible and taken great care to ensure the products and services we provide serve our customers. We value efficiency in everything we do, from creating products and building data centers to managing our supply chain and office space. We continually strive to make our processes more efficient and to reduce our impact on the environment, thereby helping our customers reduce their footprint, too. Google operates the cleanest, most energy-efficient hyperscale cloud services in the industry. Any regulation that imposes a price on carbon or regulates carbon emissions may incentivize customers to switch their technology infrastructure to take advantage of Google Cloud and Google Workspace products, which are enabling millions of businesses to shift their computing needs from self-managed data centers or colocation facilities to Google Cloud's highly efficient computing infrastructure, which includes 100% renewable energy matching, which is highly energy efficient and is carbon neutral. This could create additional demand for Google's existing products and/or services. The potential time horizon for this impact is predicted to be short-term. Some of the most substantial business decisions we've made to date that were influenced by climate change include: developing a goal to operate on carbon-free energy 24/7 by 2030, signing new renewable energy deals, regulatory advocacy, and ongoing data center efficiency efforts. As an example of a case study of one of the aforementioned strategic decisions, if new carbon regulations are implemented, Google is in a position to grow its products and services as, on average, a Google data center is twice as energy efficient as a typical enterprise data center. We achieved this through the use of increasingly efficient power supplies, evaporative cooling technology, machine learning and other innovations. As a result, we've helped customers evaluate their IT estates for their carbon impact and reduce their emissions through the use of our carbon-neutral services. We've released carbon free energy scores for our Google Cloud regions to help customers choose regions that would maximize the carbon-free energy that powers their application and reduce gross carbon emissions.</p>   |
| Supply chain and/or value chain | Yes   | <p>We have few direct emissions of greenhouse gases, therefore we do not expect our operations to be directly impacted by climate policy in the United States, nor do we expect to participate in any current or future compliance markets for carbon trading in the United States. Google does, however, face the risk of increased costs of energy if a price on carbon is applied through legislation such as cap and trade (or other mechanisms such as taxation). To the extent that a price on carbon is applied through legislation and passed on to us from a regulated entity, the cost of running our operations would likely increase. The potential time horizon for this impact is predicted to be short-term. Our strategy has been influenced in two ways: (1) we purchase renewable electricity for our operations, and (2) we design and operate our facilities to be as energy efficient as possible. Some of the most substantial business decisions we've made to date that were influenced by climate change include: developing a goal to operate on carbon-free energy 24/7 by 2030, signing new renewable energy deals, regulatory advocacy, and ongoing data center efficiency efforts. As an example of a case study, we work to reduce our exposure to the risk of a price on carbon applied through legislation by operating some of the most efficient data centers in the world, procuring carbon-free energy for our operations, and generating onsite renewable energy at several of our offices and at our data center in Belgium. As a result, in 2020, the average annual Power Usage Effectiveness (PUE) for our global fleet of data centers was 1.10, compared with the industry average of 1.59. In 2019, we announced 18 renewable energy commitments to procure 1.6 gigawatts (GW) of wind and solar power in Finland, Sweden, Denmark, Belgium, Chile, South Carolina, North Carolina, and Texas. As of the end of 2020, we had signed more than 55 agreements totaling nearly 6 GW of renewable energy. In June 2021, Google announced that we had joined the Exponential Roadmap Initiative and the Race to Zero. In joining the Race to Zero and the Exponential Roadmap Initiative, Google commits to halving emissions before 2030 towards net zero throughout the value chain.</p>  |
| Investment in R&D               | Yes   | <p>Some of the most substantial business decisions we've made to date that were influenced by climate change include: developing a goal to operate on carbon-free energy 24/7 by 2030, signing new renewable energy deals, regulatory advocacy, and ongoing data center efficiency efforts. Energy efficiency remains the most important component of our short-term strategy influenced by climate change. This includes our desire to maximize energy efficiency in order to increase the utilization of each kWh we purchase. For example, compared with five years ago, our data centers now deliver around six times as much computing power with the same amount of electrical power. We focus on reducing the energy we use by designing and building energy- and resource-efficient data centers and office buildings, as well as supporting energy efficient operations. The potential time horizon for this impact is predicted to be short-term. As an example of a case study, we believe that our scale, resources, and technological expertise can help the world meet its energy and resource needs in a responsible way that drives innovation and growth. That's why we strive to develop products that help drive carbon mitigation efforts and inform climate science. Seeing an opportunity to help raise awareness about the physical changes to the Earth's natural resources and climate, we developed Google Earth Engine (earthengine.google.com), Google's cloud platform for geospatial analysis, which is a planetary scale platform for environmental data and analysis that brings together the world's satellite imagery and makes it available online. As a result, this tool has enabled tens of thousands of active users around the world to easily analyze over 25 petabytes of freely available geospatial information, resulting in a deeper understanding of the planet. The tool's computing is done inside our carbon-neutral, 100% renewable energy-matched data centers. We've also launched the Environmental Insights Explorer (EIE)—an online tool that helps cities measure emission sources, run analyses, and identify strategies to reduce emissions. EIE published data for 100 cities by the end of 2019, and processed climate-relevant data across a sample of 3,000 cities to produce emissions insights from approximately 95 million buildings and nearly 3 trillion km traveled to support local climate action planning.</p> |
| Operations                      | Yes   | <p>We must cool our data centers to keep them in operation, and the amount of energy needed to cool them is related to the outside air temperature. If global temperatures increase, this will increase the amount of energy required to cool our data centers and increase the cost of running our operations. Given that climate change is expected to increase average temperatures globally and we have facilities and operations around the world, this is a risk we face at all of our facilities globally. In particular, this may impact our data centers located in warm climates, such as our data center in Singapore. In general, we expect that our cooling costs will go up proportionately to the increase in cooling-degree-days due to increasing average temperatures. If, for example, the number of cooling-degree-days increased by 10%, we would expect a 10% rise in our cooling costs, assuming we were not further able to improve our energy efficiency. This would have a low-medium negative financial impact. The potential time horizon for this impact is predicted to be medium-term. In addition, the potential increase in electricity prices due to the physical impacts of climate change and any resulting regulations may increase our push to source long-term contracts for renewable electricity to avoid exposure to electricity price volatility and/or increases. Some of the most substantial business decisions we've made to date that were influenced by climate change include: developing a goal to operate on carbon-free energy 24/7 by 2030, signing new renewable energy deals, regulatory advocacy, and ongoing data center efficiency efforts. As an example of a case study, we mitigate potential increases in long-term energy prices and work towards our goal of operating on carbon-free energy on a 24/7 basis by 2030 by looking for opportunities to procure renewable energy via long-term contracts with stable prices, such as power purchase agreements (PPAs). As a result, by the end of 2020, we had signed more than 55 power purchase agreements for nearly 6 GW of renewable energy that is new to the grid. In June 2021, Google announced that we had joined the Exponential Roadmap Initiative and the Race to Zero. In joining the Race to Zero and the Exponential Roadmap Initiative, Google commits to halving emissions before 2030 towards net zero throughout the value chain.</p>                 |

**C3.4**

**(C3.4) Describe where and how climate-related risks and opportunities have influenced your financial planning.**

|       | Financial planning elements that have been influenced   | Description of influence  |
|-------|---|---|
| Row 1 | Revenues<br>Indirect costs<br>Capital expenditures<br>Capital allocation<br>Assets<br>Liabilities | <p>Capital expenditures: The availability of our products and services depends on the continuing operation of our information technology and communications systems. We invest in land and buildings for data centers and offices, and information technology assets, which includes servers and network equipment, to support the long-term growth of our business. Our systems are vulnerable to damage, interference or interruption from natural disasters, the effects of climate change (such as sea level rise, drought, flooding, wildfires, and increased storm severity), or other factors. The potential time horizon for this impact is predicted to be medium-term. Our headquarters are located in Mountain View, California. We also own and lease office and building space in the surrounding areas near our headquarters. In addition, we own and lease office/building space and research and development sites around the world, primarily in North America, Europe, South America, and Asia. As an example of a case study, in 2017, we conducted an assessment of Google's exposure to climate risk in the near-term (2020-2025), mid-term (2050), and long-term (2100). This included a global assessment of the impact of flooding on our real estate operations. Based on RCP 4.5 and 8.5, the San Francisco Bay Area is projected to experience sea level rise between 18.5-26.0 inches by the end of the century. Even though the location of Google's Bay Area headquarters is not projected to experience the highest level of sea level rise when compared to the other Google sites assessed as part of this study, the location of the buildings in Mountain View, Sunnyvale, and Palo Alto and the importance of these sites as Google's global headquarters places those facilities at a particularly high risk when mapped against anticipated sea level rise. Many of Google's buildings in these locations are located in the current 100-year floodplain and, therefore, are at risk to impacts from coastal flooding in the present day. Those risks will only be further exacerbated by sea level rise throughout the century. Since flooding and extreme heat have emerged as critical climate risks that could have a significant impact on physical assets and occupants, they have been considered as part of the overall development strategy for Google's expanding footprint. In an effort to address this risk, Google's Urban Ecology Program focuses on designing healthy, biodiverse ecosystems that can endure and evolve with a changing climate. As a result, Google has planted 1.4 acres of native vegetation in our "Green Loop," added roughly 5.9 acres of riparian habitat and 1,800 native trees to the Charleston Retention Basin, and designed our Bay View site like a bay's edge, with large meadows, emergent and freshwater marsh, and one of the largest willow groves ever planted in the region. For more information on Google's Urban Ecology program, see: <a href="https://sustainability.google/projects/urban-ecology/">https://sustainability.google/projects/urban-ecology/</a> In 2020, Google conducted an updated climate risk assessment, building on the previous risk assessment that was conducted in 2017. This included climate scenario analysis, referencing RCP 4.5 and 8.5, and an assessment of the impact of flooding, water stress, extreme heat and wildfires on 26 priority office sites and 23 data center locations. The key result of this scenario analysis was that increased exposure to extreme heat and flooding is likely to impact many of our global offices and data centers as early as 2030. The 2020 climate risk assessment continues to inform Google's Ecology Program and efforts. Additionally, in 2015, Google developed a set of Principles of Climate Resilience, which support our definition of climate risk and resilience. From there, we created a framework that prioritizes impacts to people (including communities, users, and Googlers) so that it represents the different aspects of climate resilience within Google, as well as the internal and external actors who either influence or are influenced by Google's climate resilience decisions. For more information, see: <a href="https://ssir.org/articles/entry/connecting_climate_resilience_to_the_bottom_line">https://ssir.org/articles/entry/connecting_climate_resilience_to_the_bottom_line</a></p> <p>Indirect costs: Running our business requires us to use a lot of electricity to power our data centers, offices, and other infrastructure. Google has 23 data center locations across four continents. In 2020, our total energy consumption was 15,439,538 MWh. We must cool our data centers to keep them in operation, and the amount of energy needed to cool them is related to the outside air temperature. If global temperatures increase, this will increase the amount of energy required to cool our data centers and increase the cost of running our operations. Given that climate change is expected to increase average temperatures globally and we have facilities and operations around the world, this is a risk we face at all of our facilities globally. In particular, this may impact our data centers located in warm climates, such as our data center in Singapore. The potential time horizon for this impact is predicted to be medium-term. In general, we expect that our cooling costs will go up proportionately to the increase in cooling-degree-days due to increasing average temperatures. We are not able to predict the exact temperature increase, but if, for example, the number of cooling-degree-days increased by 10%, we would expect a 10% rise in our cooling costs, assuming we were not further able to improve our energy efficiency. This would have a low-medium negative financial impact.</p> |

C3.4a

**(C3.4a) Provide any additional information on how climate-related risks and opportunities have influenced your strategy and financial planning (optional).**

Since our founding, we've focused on providing the best user experience possible and taken great care to ensure the products and services we provide serve our customers. We value efficiency in everything we do, from creating products and building data centers to managing our supply chain and office space. We continually strive to make our processes more efficient and to reduce our impact on the environment, thereby helping our customers reduce their footprint, too. Google Cloud and Google Workspace products like Gmail, Docs, and Drive are enabling millions of businesses to shift their computing needs from self-managed data centers or colocation facilities to Google Cloud's highly efficient computing infrastructure, which includes 100% renewable energy matching.

i. Our strategy around carbon mitigation for operations has been influenced in two ways: (1) we purchase carbon-free energy for our operations, and (2) we design and operate our facilities to be as energy efficient as possible.

Our internal reporting process enables us to track progress toward our goals and influence future strategies. Both the Technical Infrastructure and Real Estate teams develop strategies to reach our goals. These are then translated into programs and projects whose results are reported to the SVP of Cloud Infrastructure and the VP of Real Estate quarterly. This process is embedded across the company and the feedback mechanism of quarterly reporting helps further influence future strategies. For example, our Real Estate team runs an internal Sustainable Workplace Standards program, which requires offices and design and construction projects to comply with a set of annual and ongoing sustainability best practices.

ii. Physical and regulatory risks also influence our strategy. Specifically, the potential increase in electricity prices due to the physical impacts of climate change and any resulting regulations have increased our push to source long-term contracts for renewable electricity to avoid exposure to electricity price volatility. Additionally, by adopting long-term contracts for renewable electricity now, we stay ahead of potential future regulations.

iii. Energy efficiency remains the most important component of our short-term strategy influenced by climate change. For example, compared with five years ago, our data centers now deliver around six times as much computing power with the same amount of electrical power. We focus on reducing the energy we use by designing and building energy- and resource-efficient data centers and office buildings, as well as supporting energy efficient operations.

iv. In 2007, we announced our goal to become carbon neutral, which we achieved that year, and have maintained for 14 consecutive years. In 2020, we neutralized our legacy carbon footprint since our founding, making Google the first major company to be carbon neutral for its entire operating history.

In 2012, we set a long-term goal to purchase enough renewable energy to match all the electricity we consume globally on an annual basis. For the past four years, in 2017, 2018, 2019, and 2020, we achieved it: Google's total purchase of energy from sources like wind and solar exceeded the amount of electricity used by our operations around the world, including our offices, data centers, and networking infrastructure.

In 2020, we announced our biggest sustainability moonshot yet: By 2030, we aim to run our business on carbon-free energy everywhere, at all times. This means that we'll evolve from matching our annual energy consumption with renewable energy to sourcing round-the-clock carbon-free energy. To meet that goal, we continue to pursue long-term contracts for the purchase of carbon-free electricity which, over the long term, will reduce our carbon footprint and help protect us from the aforementioned risks. Another part of our long-term strategy is to encourage the development and deployment of more carbon-free energy through policy advocacy.

v. On average, a Google data center is twice as energy efficient as a typical enterprise data center, and Google is the largest annual corporate purchaser of renewable energy in the world. Ensuring stable electricity prices over the long term could help lower our operational costs, and help decrease the aforementioned sourcing and potential regulatory risks. Companies and users that choose our products and services can be confident that we're helping them minimize their environmental impact—even as their needs and services scale.

vi. Some of the most substantial business decisions we made that were influenced by climate change include developing a goal to operate on carbon-free energy 24/7 by 2030, signing new renewable energy deals, regulatory advocacy, and ongoing data center efficiency efforts, as follows:

-In 2019, we announced 18 renewable energy commitments to procure 1.6 gigawatts (GW) of wind and solar power in Finland, Sweden, Denmark, Belgium, Chile, South Carolina, North Carolina, and Texas. As of the end of 2020, we had signed more than 55 agreements totaling nearly 6 GW of renewable energy.

- We collaborated with other corporate renewable energy buyers and project developers via the RE-Source Platform to develop and advocate a joint policy position to enable Corporate Power Purchase Agreements (CPPAs) to play a greater role in delivering the EU Green Deal. We advocated for the RE-Source Platform to play a stronger role on energy policy advocacy, which contributed to the creation of a dedicated policy working group within RE-Source. We also helped set up a new Green Deal Working Group within Digital Europe which is advocating for policy change to enable digital solutions to support the EU's goal to become a climate neutral continent.

- Google joined other corporate renewable energy buyers in signing on to a letter to European Commissioners calling on Europe to use its COVID recovery package to support scaling up of renewable energy, and to ensure that barriers to corporate PPAs are removed. We also joined over 1,500 businesses, cities, states, tribal nations, and other institutions as part of the We Are Still In coalition to call upon the incoming U.S. Administration to align with net-zero emissions by 2050.

- In 2013, we became the first company in North America—and the only major internet company—to achieve a multi-site energy management system certification to ISO 50001. As of 2020, we have maintained our ISO 50001 certification for our operational European data centers.

The aspect of climate change that influenced these business decisions is the potential physical and regulatory impacts of climate change, as explained in (i).

-

## C4. Targets and performance

---

### C4.1

---

#### (C4.1) Did you have an emissions target that was active in the reporting year?

Absolute target

#### C4.1a

---

##### (C4.1a) Provide details of your absolute emissions target(s) and progress made against those targets.

**Target reference number**

Abs 1

**Year target was set**

2019

**Target coverage**

Company-wide

**Scope(s) (or Scope 3 category)**

Scope 1+2 (market-based) +3 (upstream)

**Base year**

2019

**Covered emissions in base year (metric tons CO2e)**

1163109

**Covered emissions in base year as % of total base year emissions in selected Scope(s) (or Scope 3 category)**

100

**Target year**

2020

**Targeted reduction from base year (%)**

100

**Covered emissions in target year (metric tons CO2e) [auto-calculated]**

0

**Covered emissions in reporting year (metric tons CO2e)**

0

**% of target achieved [auto-calculated]**

100

**Target status in reporting year**

Achieved

**Is this a science-based target?**

No, and we do not anticipate setting one in the next 2 years

**Target ambition**

<Not Applicable>

**Please explain (including target coverage)**

Every year, we have a goal of being carbon neutral. As of December 31, 2020, we reached carbon neutrality for 100% of our FY2020 operational emissions, which represent Scope 1 + Scope 2 (market-based) + Scope 3 (business travel, candidate travel, and employee commuting). Abs1 covers Scope 1 + Scope 2 (market-based) + Scope 3 (business travel, candidate travel, and employee commuting). We committed to being carbon neutral in 2007 and we have achieved this goal each year since then. We maintain our commitment to carbon neutrality of our operational footprint first through energy efficiency, second, by signing long-term contracts for renewable energy directly from our utility providers and from renewable energy facilities in the same grid regions as our data centers, and lastly, by investing in high-quality carbon offset projects. In 2020, we achieved 14 consecutive years of carbon neutrality. In 2020, we also neutralized our legacy carbon footprint since our founding, making Google the first major company to be carbon neutral for its entire operating history. We understand that CDP does not acknowledge carbon offsets as a way to reduce emissions, however, we do recognize offsets as a viable and important approach for mitigating our carbon emissions impact, as well as a critical component of our three-tiered carbon neutrality strategy. In June 2021, Google announced that we had joined the Exponential Roadmap Initiative and the Race to Zero. In joining the Race to Zero and the Exponential Roadmap Initiative, Google commits to halving emissions before 2030 towards net zero throughout the value chain. For more details, see <https://exponentialroadmap.org/partners>.

**Target reference number**

Abs 2

**Year target was set**

2015

**Target coverage**

Company-wide

**Scope(s) (or Scope 3 category)**

Scope 1+2 (market-based)



**Base year**

2015

**Covered emissions in base year (metric tons CO2e)**

1451418

**Covered emissions in base year as % of total base year emissions in selected Scope(s) (or Scope 3 category)**

100

**Target year**

2025

**Targeted reduction from base year (%)**

100

**Covered emissions in target year (metric tons CO2e) [auto-calculated]**

0

**Covered emissions in reporting year (metric tons CO2e)**

0

**% of target achieved [auto-calculated]**

100

**Target status in reporting year**

Achieved

**Is this a science-based target?**

No, and we do not anticipate setting one in the next 2 years

**Target ambition**

&lt;Not Applicable&gt;

**Please explain (including target coverage)**

Abs2 includes Low1, as well as Scope 1 emissions. In 2012, we set a long-term goal to purchase enough renewable energy to match all the electricity we consume globally on an annual basis. For the past four years (2017-2020) we achieved it: Google's total purchase of energy from sources like wind and solar exceeded the amount of electricity used by our operations around the world, including offices, data centers, and networking infrastructure. While we're still drawing power from the grid, some of which is from fossil fuel resources, we're purchasing enough wind and solar energy to match every megawatt-hour (MWh) of electricity our data center and office operations consume annually. In 2020, our annual GHG reductions from our renewable energy projects were 4.9 million metric tons. This puts us 341% of the way towards this goal from an emissions reduction perspective. Google is the largest annual corporate purchaser of renewable energy in the world. From 2010 to 2020, we've signed more than 55 agreements totaling nearly 6 gigawatts of renewable energy. Reaching our 100% renewable purchasing goal means that Google buys on an annual basis the same amount of MWh of renewable energy—both the physical energy and its corresponding renewable energy certificates (RECs)—as the amount of MWh of electricity that we consume for our operations around the world. Where possible, we buy this energy directly from our utility providers and from renewable energy facilities in the same grid regions as our data centers. Since we're using Abs2 as our interim target for Abs3 and it would be difficult to predict our emissions in 2040, we used most of the same data here for Abs3 as we did for Abs2. We know we'll increase our annual GHG emissions reduction by at least 1.8 million tCO2e of emissions (our Abs2 target) sometime before 2040. The actual reduction in tCO2 will likely be greater as we believe our Scope 2 emissions will grow between our base year and 2040. Matching 100% renewable energy is just the beginning. We'll continue to buy renewable energy to match our growing electricity load. And in those regions where we can't yet buy renewables, we'll keep working on ways to help open the market. By 2030, we aim to operate on carbon-free energy 24/7. For more details about our 24/7 Carbon-free Energy goal, see <https://sustainability.google/commitments/>

**Target reference number**

Abs 3

**Year target was set**

2015

**Target coverage**

Company-wide

**Scope(s) (or Scope 3 category)**

Scope 1+2 (market-based)

**Base year**

2015

**Covered emissions in base year (metric tons CO2e)**

1451418

**Covered emissions in base year as % of total base year emissions in selected Scope(s) (or Scope 3 category)**

100

**Target year**

2040

**Targeted reduction from base year (%)**

100

**Covered emissions in target year (metric tons CO2e) [auto-calculated]**

0

**Covered emissions in reporting year (metric tons CO2e)**

0

**% of target achieved [auto-calculated]**

100

**Target status in reporting year**

Achieved

**Is this a science-based target?**

No, and we do not anticipate setting one in the next 2 years

**Target ambition**

<Not Applicable>

**Please explain (including target coverage)**

Abs3 includes Low1, as well as Scope 1 emissions. In 2012, we set a long-term goal to purchase enough renewable energy to match all the electricity we consume globally on an annual basis. For the past four years (2017-2020) we achieved it: Google's total purchase of energy from sources like wind and solar exceeded the amount of electricity used by our operations around the world, including offices, data centers, and networking infrastructure. While we're still drawing power from the grid, some of which is from fossil fuel resources, we're purchasing enough wind and solar energy to match every megawatt-hour (MWh) of electricity our data center and office operations consume annually. In 2020, our annual GHG reductions from our renewable energy projects were 4.9 million metric tons. This puts us 341% of the way towards this goal from an emissions reduction perspective. Google is the largest annual corporate purchaser of renewable energy in the world. From 2010 to 2020, we've signed more than 55 agreements totaling nearly 6 gigawatts of renewable energy. Reaching our 100% renewable purchasing goal means that Google buys on an annual basis the same amount of MWh of renewable energy—both the physical energy and its corresponding renewable energy certificates (RECs)—as the amount of MWh of electricity that we consume for our operations around the world. Where possible, we buy this energy directly from our utility providers and from renewable energy facilities in the same grid regions as our data centers. Since we're using Abs2 as our interim target for Abs3 and it would be difficult to predict our emissions in 2040, we used most of the same data here for Abs3 as we did for Abs2. We know we'll increase our annual GHG emissions reduction by at least 1.8 million tCO2e of emissions (our Abs2 target) sometime before 2040. The actual reduction in tCO2 will likely be greater as we believe our Scope 2 emissions will grow between our base year and 2040. Matching 100% renewable energy is just the beginning. We'll continue to buy renewable energy to match our growing electricity load. And in those regions where we can't yet buy renewables, we'll keep working on ways to help open the market. By 2030, we aim to operate on carbon-free energy 24/7. For more details about our 24/7 Carbon-free Energy goal, see <https://sustainability.google/commitments/>

C4.2

**(C4.2) Did you have any other climate-related targets that were active in the reporting year?**

Target(s) to increase low-carbon energy consumption or production

C4.2a

**(C4.2a) Provide details of your target(s) to increase low-carbon energy consumption or production.**

**Target reference number**

Low 1

**Year target was set**

2015

**Target coverage**

Company-wide

**Target type: absolute or intensity**

Intensity

**Target type: energy carrier**

Electricity

**Target type: activity**

Consumption

**Target type: energy source**

Renewable energy source(s) only

**Metric (target numerator if reporting an intensity target)**

Percentage

**Target denominator (intensity targets only)**

Other, please specify (Total annual global electricity consumption)

**Base year**

2015

**Figure or percentage in base year**

48

**Target year**

2040

**Figure or percentage in target year**

100

**Figure or percentage in reporting year**

100

**% of target achieved [auto-calculated]**

100

**Target status in reporting year**

Achieved

**Is this target part of an emissions target?**

Abs3

**Is this target part of an overarching initiative?**

RE100

**Please explain (including target coverage)**

Low1 is the Scope 2 portion of Abs3. In 2012, we set a long-term goal to purchase enough renewable energy to match all the electricity we consume globally on an annual basis. In 2020, we achieved it for the fourth year in a row: Google's total purchase of energy from sources like wind and solar exceeded the amount of electricity used by our operations around the world, including offices, data centers, and networking infrastructure. While we're still drawing power from the grid, some of which is from fossil fuel resources, we're purchasing enough wind and solar energy to match every megawatt-hour (MWh) of electricity our data center and office operations consume annually. Google is the largest annual corporate purchaser of renewable energy in the world. From 2010 to 2020, we've signed more than 55 agreements totaling nearly 6 gigawatts of renewable energy. Reaching our 100% renewable purchasing goal means that Google buys on an annual basis the same amount of megawatt-hours (MWh) of renewable energy—both the physical energy and its corresponding renewable energy certificates (RECs)—as the amount of MWh of electricity that we consume for our operations around the world. Where possible, we buy this energy directly from our utility providers and from green energy facilities in the same grid regions as our data centers. In 2020, our operational Scope 1 and Scope 2 emissions were 84% lower due to our renewable energy procurement. Matching 100% renewable energy is just the beginning. We're building new data centers and offices, and as demand for Google products grows, so does our electricity load. We need to be constantly adding renewables to our portfolio to keep up. So we'll keep signing contracts to buy more renewable energy. And in those regions where we can't yet buy renewables, we'll keep working on ways to help open the market. In 2015, Google joined the RE100 initiative—an initiative led by the Climate Group and CDP—as well as the We Mean Business coalition, committing to procure 100% of our electricity from renewable sources. In 2018, we announced our ambition to power all of our data centers with carbon-free energy on a 24/7 basis (every hour of every day). In 2020, committed to becoming the first major company to operate on carbon-free energy 24/7—everywhere, at all times—by 2030.

**Target reference number**

Low 2

**Year target was set**

2020

**Target coverage**

Company-wide

**Target type: absolute or intensity**

Intensity

**Target type: energy carrier**

Electricity

**Target type: activity**

Consumption

**Target type: energy source**

Low-carbon energy source(s)

**Metric (target numerator if reporting an intensity target)**

Percentage

**Target denominator (intensity targets only)**

Other, please specify (Total annual global electricity consumption)

**Base year**

2019

**Figure or percentage in base year**

61

**Target year**

2030

**Figure or percentage in target year**

100

**Figure or percentage in reporting year**

67

**% of target achieved [auto-calculated]**

15.3846153846154

**Target status in reporting year**

New

**Is this target part of an emissions target?**

No

**Is this target part of an overarching initiative?**

No, it's not part of an overarching initiative

**Please explain (including target coverage)**

Low2 represents our commitment to to run our business on carbon-free energy everywhere, at all times by 2030. In 2018, we announced a long-term ambition to sourcing carbon-free energy for our operations 24/7. This means that we'll evolve from matching our annual energy consumption with renewable energy to sourcing carbon-free energy around the clock. In 2020, building on what we'd learned and due to the transformation underway in the global energy system, we set a deadline for our carbon-free energy goal: By 2030, Google intends to run on carbon-free energy 24/7—everywhere, at all times. Starting with our data centers, and then moving on to our office campuses, we aim to bring clean energy to Google's operations in a way that eliminates our emissions and accelerates a global energy transition. This is our biggest sustainability moonshot yet, with enormous practical and technical complexity. We're the first major company to commit to sourcing 24/7 carbon-free energy for our operations, and we aim to be the first to achieve it. In 2020, we matched 100% of our annual global electricity consumption with renewable energy for the fourth consecutive year, but on an hourly basis, only 67% of our data center electricity use was matched with regional carbon-free sources.

(C4.3) Did you have emissions reduction initiatives that were active within the reporting year? Note that this can include those in the planning and/or implementation phases.

Yes

C4.3a

(C4.3a) Identify the total number of initiatives at each stage of development, and for those in the implementation stages, the estimated CO2e savings.

|                           | Number of initiatives | Total estimated annual CO2e savings in metric tonnes CO2e (only for rows marked *) |
|---------------------------|-----------------------|--|
| Under investigation       | 0                     | 0  |
| To be implemented*        | 2                     | 0  |
| Implementation commenced* | 2                     | 45   |
| Implemented*              | 427                   | 21327  |
| Not to be implemented     | 0                     | 0  |

C4.3b

(C4.3b) Provide details on the initiatives implemented in the reporting year in the table below.

**Initiative category & Initiative type**

|                                |  |
|--------------------------------|--|
| Energy efficiency in buildings | Other, please specify (Various energy efficiency projects) |
|--------------------------------|--|

**Estimated annual CO2e savings (metric tonnes CO2e)**

95

**Scope(s)**

Scope 1

Scope 2 (market-based)

**Voluntary/Mandatory**

Voluntary

**Annual monetary savings (unit currency – as specified in C0.4)**

1057349

**Investment required (unit currency – as specified in C0.4)**

9400000

**Payback period**

4-10 years

**Estimated lifetime of the initiative**

21-30 years

**Comment**

Ongoing implementation of multi-year energy efficiency projects in our New York office as part of the NYC Carbon Challenge. In 2020, progress was made on 3 projects. In 2011, Google committed to the NYC Carbon Challenge. It asked companies to strive for a 30% GHG reduction per FTE by 2030, but we volunteered to go beyond this and committed to a 50% reduction by 2025. We exceeded this goal in 2018, seven years early. Google has many emissions reduction initiatives and we've chosen only a small subset to detail out here as examples of the activities we've implemented in the reporting year.

**Initiative category & Initiative type**

|                                |  |
|--------------------------------|--|
| Energy efficiency in buildings | Other, please specify (Various energy efficiency projects) |
|--------------------------------|--|

**Estimated annual CO2e savings (metric tonnes CO2e)**

12928

**Scope(s)**

Scope 1

Scope 2 (market-based)

**Voluntary/Mandatory**

Voluntary

**Annual monetary savings (unit currency – as specified in C0.4)**

3500000

**Investment required (unit currency – as specified in C0.4)**

24055000

**Payback period**

<1 year

**Estimated lifetime of the initiative**

Ongoing

**Comment**

Implementation of ongoing energy efficiency improvements in our San Francisco Bay Area offices. In 2020, 415 individual projects were implemented. Google has many emissions reduction initiatives and we've chosen only a small subset to detail out here as examples of the activities we've implemented in the reporting year.

**Initiative category & Initiative type**

|                |                    |
|----------------|--------------------|
| Transportation | Employee commuting |
|----------------|--------------------|

**Estimated annual CO2e savings (metric tonnes CO2e)**

7000

**Scope(s)**

Scope 3

**Voluntary/Mandatory**

Voluntary

**Annual monetary savings (unit currency – as specified in C0.4)**

0

**Investment required (unit currency – as specified in C0.4)**

0

**Payback period**

No payback

**Estimated lifetime of the initiative**

Ongoing

**Comment**

This initiative covers employee commuting. Our Transportation team plans, implements, and operates mobility solutions to support Google's global growth. We set ambitious goals for helping Googlers transition to shuttles, carpooling, public transit, biking, and walking. We have a long-term goal of reducing single-occupancy vehicle commuting at our Bay Area headquarters to 45%. In 2020, from January to March, our Google shuttle buses in the Bay Area produced savings of approximately 7,000 tCO2e emissions. Note: This program was impacted due to the global pandemic in 2020. Monetary savings and investment required are confidential, so we've input \$0. Google has many emissions reduction initiatives and we've chosen only a small subset to detail out here as examples of the activities we've implemented in the reporting year.

**Initiative category & Initiative type**

|                                |          |
|--------------------------------|----------|
| Energy efficiency in buildings | Lighting |
|--------------------------------|----------|

**Estimated annual CO2e savings (metric tonnes CO2e)**

227

**Scope(s)**

Scope 2 (market-based)

**Voluntary/Mandatory**

Voluntary

**Annual monetary savings (unit currency – as specified in C0.4)**

18221

**Investment required (unit currency – as specified in C0.4)**

30000

**Payback period**

1-3 years

**Estimated lifetime of the initiative**

16-20 years

**Comment**

Small pilot to upgrade fluorescent fixtures to LEDs with smart controls at our Iowa data center. This represents progress made on this project in 2020. Google has many emissions reduction initiatives and we've chosen only a small subset to detail out here as examples of the activities we've implemented in the reporting year.

**Initiative category & Initiative type**

|                                |  |
|--------------------------------|--|
| Energy efficiency in buildings | Other, please specify (Various energy efficiency projects) |
|--------------------------------|--|

**Estimated annual CO2e savings (metric tonnes CO2e)**

616

**Scope(s)**

Scope 2 (market-based)

**Voluntary/Mandatory**

Please select

**Annual monetary savings (unit currency – as specified in C0.4)**

160831

**Investment required (unit currency – as specified in C0.4)**

23961

**Payback period**

<1 year

**Estimated lifetime of the initiative**

Ongoing

**Comment**

Implementation of initiatives to improve energy management at four of our offices in Kirkland, Washington in 2020. Google has many emissions reduction initiatives and we've chosen only a small subset to detail out here as examples of the activities we've implemented in the reporting year.

**Initiative category & Initiative type**

|                                |  |
|--------------------------------|--|
| Energy efficiency in buildings | Other, please specify (Various energy efficiency projects) |
|--------------------------------|--|

**Estimated annual CO2e savings (metric tonnes CO2e)**

506

**Scope(s)**

Scope 2 (market-based)

**Voluntary/Mandatory**

Voluntary

**Annual monetary savings (unit currency – as specified in C0.4)**

61801

**Investment required (unit currency – as specified in C0.4)**

14592

**Payback period**

<1 year

**Estimated lifetime of the initiative**

Ongoing

**Comment**

Implementation of initiatives to improve energy management at two of our offices in Krakow, Poland in 2020. Google has many emissions reduction initiatives and we've chosen only a small subset to detail out here as examples of the activities we've implemented in the reporting year.

**C4.3c**

**(C4.3c) What methods do you use to drive investment in emissions reduction activities?**

| Method                                 | Comment   |
|--|---|
| Dedicated budget for energy efficiency | We conduct payback calculations to decide which emissions reduction activities will best help us meet our emissions reductions and carbon-free energy goals and deliver the best financial returns to the company.  |
| Other                                  | By 2030, Google intends to run on carbon-free energy everywhere, at all times. We're committed to action far beyond our own operations, creating tools and investing in technologies to help build a carbon-free future for everyone. We'll continue to support policies that drive rapid deployment of clean energy, help commercialize next-generation technologies, and speed retirement of carbon-based resources. Additionally, we'll fund important research that charts pathways to decarbonization on grids around the world. |

**C4.5**

**(C4.5) Do you classify any of your existing goods and/or services as low-carbon products or do they enable a third party to avoid GHG emissions?**

Yes

**C4.5a**

**(C4.5a) Provide details of your products and/or services that you classify as low-carbon products or that enable a third party to avoid GHG emissions.**

**Level of aggregation**

Company-wide

**Description of product/Group of products**

Google Services' core products and platforms include Android, Chrome, Gmail, Google Drive, Google Maps, Google Photos, Google Play, Search, and YouTube, each with broad and growing adoption by users around the world. Google Cloud includes Google's infrastructure and data analytics platforms, collaboration tools, and other services for enterprise customers. In 2020, we set a goal to offer 1 billion people new ways to live more sustainably via our core products by 2022. Over the next two years, we'll continue to build features that connect people with more sustainable options and offer actionable information at the right time.

**Are these low-carbon product(s) or do they enable avoided emissions?**

Low-carbon product

**Taxonomy, project or methodology used to classify product(s) as low-carbon or to calculate avoided emissions**

Other, please specify (Our own methodology)

**% revenue from low carbon product(s) in the reporting year**

**% of total portfolio value**

<Not Applicable>

**Asset classes/ product types**

<Not Applicable>

**Comment**

Many of Alphabet's and Google's products and services directly help users avoid Scope 2 GHG emissions, since, on average, a Google data center is twice as energy efficient as a typical enterprise data center, our carbon-neutral cloud is the cleanest and most energy efficient in the industry, and we adhere to the highest certified environmental, health and safety standards. Compared with five years ago, we now deliver around six times as much computing power with the same amount of electrical power.

---

**Level of aggregation**

Group of products

**Description of product/Group of products**

Google Cloud: Google Cloud enables developers to build, test, and deploy applications on Google's highly-scalable and reliable infrastructure. Key products include: Compute Engine, App Engine, Container Engine, BigQuery, Cloud Storage, Cloud Bigtable, Cloud Networking, and Google AI. For more information on Google Cloud, see: <https://cloud.google.com/products/>

**Are these low-carbon product(s) or do they enable avoided emissions?**

Low-carbon product

**Taxonomy, project or methodology used to classify product(s) as low-carbon or to calculate avoided emissions**

Other, please specify (Our own methodology)

**% revenue from low carbon product(s) in the reporting year**

**% of total portfolio value**

<Not Applicable>

**Asset classes/ product types**

<Not Applicable>

**Comment**

A number of Google's products and services directly help users avoid scope 2 GHG emissions. When developers and businesses work in the cloud with Google Cloud, they're using infrastructure built on our data centers. On average, a Google data center is twice as energy efficient as a typical enterprise data center. In fact, compared with five years ago, we now deliver around six times as much computing power with the same amount of electrical power. Google has been carbon neutral since 2007. For more information on Google Cloud Products & Services, see: <https://cloud.google.com/products/> See also our response above specific to Gmail, which is one of our Cloud-based services.

---

**Level of aggregation**

Group of products

**Description of product/Group of products**

Google Workspace (formerly known as G Suite) (including Google Workspace for Education and Google Workspace for Nonprofits) is a set of cloud-based apps designed with security and machine intelligence to transform how teams of all sizes connect, create, and collaborate together—on any device, from any location. Google Workspace includes communication and collaboration tools like Gmail, Calendar, Meet, Chat, Drive, Docs, Sheets, Slides, Forms, Sites, and more. Google Workspace for Education is the same set of apps as Google Workspace, but includes Google Classroom, and is designed with features that make work easier and bring teachers and students together. Google Workspace for Nonprofits provides a set of specific features and functionality to help nonprofits collaborate and communicate more effectively. Nonprofit users also get discounted access to Google Workspace Business and Enterprise editions. Nonprofits use Google Workspace to communicate, collaborate, streamline operations, and get work done virtually. For more details, see <https://www.google.com/nonprofits/offerings/workspace/>

**Are these low-carbon product(s) or do they enable avoided emissions?**

Low-carbon product

**Taxonomy, project or methodology used to classify product(s) as low-carbon or to calculate avoided emissions**

Other, please specify (Our own methodology)

**% revenue from low carbon product(s) in the reporting year**

**% of total portfolio value**

<Not Applicable>

**Asset classes/ product types**

<Not Applicable>

**Comment**

A number of Google's products and services directly help users avoid Scope 2 GHG emissions. Emissions are avoided due to our data center energy efficiency efforts as well as our carbon neutrality. This means businesses that use our cloud-based products are greener too. We studied the energy efficiency benefits of our products by looking at the use of Google Workspace (formerly known as G Suite) at large. By switching to Google Workspace, companies have reduced office computing costs, energy use, and carbon emissions by 65% to 90%. Since our cloud is carbon neutral, we help further mitigate the carbon impact for businesses that use Google Workspace. The experience of one of our large Google Workspace clients, the U.S. General Services Administration (GSA), supports these findings. By switching to Google Workspace for its approximately 17,000 users, the GSA reduced server energy consumption by nearly 90% and carbon emissions by 85%. This represents an annual emissions reduction of 1,570 tonnes of CO2. For more information, see our white paper "Google Apps: Energy Efficiency in the Cloud": [http://static.googleusercontent.com/external\\_content/untrusted\\_dlcp/www.google.com/en/us/green/pdf/google-apps.pdf](http://static.googleusercontent.com/external_content/untrusted_dlcp/www.google.com/en/us/green/pdf/google-apps.pdf)

---

**Level of aggregation**

Product

**Description of product/Group of products**

Gmail: Gmail is advanced email with a huge inbox, lightning-fast search, built-in instant messaging, voice calling and video chat.

**Are these low-carbon product(s) or do they enable avoided emissions?**

Low-carbon product

**Taxonomy, project or methodology used to classify product(s) as low-carbon or to calculate avoided emissions**

Other, please specify (Our own methodology)

**% revenue from low carbon product(s) in the reporting year****% of total portfolio value**

&lt;Not Applicable&gt;

**Asset classes/ product types**

&lt;Not Applicable&gt;

**Comment**

A number of Google's products and services directly help users avoid Scope 2 GHG emissions. For example, Gmail, Google's cloud-based email service, is more energy efficient than email hosted locally. Because the cloud supports many products at a time, it can more efficiently distribute resources among many users. That means we can do more with less energy—and other businesses can too. In addition, we've engineered our cloud-based services to run on efficient custom-designed servers that live in data centers that we've built to be as efficient as possible. Lawrence Berkeley National Laboratory published research indicating that moving all office workers in the United States to the cloud could reduce the energy used by information technology by up to 87%. To learn more about the energy efficiency potential of cloud-based software, see the paper: [http://crd.lbl.gov/assets/pubs\\_presos/ACS/cloud\\_efficiency\\_study.pdf](http://crd.lbl.gov/assets/pubs_presos/ACS/cloud_efficiency_study.pdf) Businesses that use Gmail have decreased the environmental impact of their email service by up to 98% compared to those that run email on local servers. Google can provide Gmail service to 80 companies for the same amount of energy that a single company would typically use to run email services locally. Small businesses with fewer than 50 people can save up to 172.8 kWh of energy and 101.6 kg of carbon per user per year by using Gmail, resulting in 1,490,925 tonnes of CO2 net savings over one year. Further details and methodology can be found in our published white paper "Google's Green Computing: Efficiency at Scale." [http://static.googleusercontent.com/external\\_content/untrusted\\_dlcp/www.google.com/en/us/green/pdfs/google-green-computing.pdf](http://static.googleusercontent.com/external_content/untrusted_dlcp/www.google.com/en/us/green/pdfs/google-green-computing.pdf)

**Level of aggregation**

Group of products

**Description of product/Group of products**

Google Shopping

**Are these low-carbon product(s) or do they enable avoided emissions?**

Avoided emissions

**Taxonomy, project or methodology used to classify product(s) as low-carbon or to calculate avoided emissions**

Other, please specify (Our own methodology)

**% revenue from low carbon product(s) in the reporting year****% of total portfolio value**

&lt;Not Applicable&gt;

**Asset classes/ product types**

&lt;Not Applicable&gt;

**Comment**

Google Shopping is committed to shaping a sustainable shopping journey. Google Shopping (Buy on Google orders) is carbon neutral in the US and France. To achieve this, we offset carbon emissions generated from shipping orders to customers. We've continually offset emissions since October 2019. Additionally, sustainability filters and zero-plastic packaging options for stores in Google Shopping in the United States offer new functionality to enable users to make sustainable choices. For more details, please see <https://support.google.com/googleshopping/answer/9487502> These efforts help third-parties avoid Scope 3 emissions.

**Level of aggregation**

Product

**Description of product/Group of products**

Nest thermostat

**Are these low-carbon product(s) or do they enable avoided emissions?**

Avoided emissions

**Taxonomy, project or methodology used to classify product(s) as low-carbon or to calculate avoided emissions**

Other, please specify (Our own methodology)

**% revenue from low carbon product(s) in the reporting year****% of total portfolio value**

&lt;Not Applicable&gt;

**Asset classes/ product types**

&lt;Not Applicable&gt;

**Comment**

Avoided emissions represent the third party's Scope 1 and/or Scope 2 emissions. Nest thermostats give owners the power to save energy. In fact, as of December 31, 2020, Nest thermostats had saved more than 65 billion kWh -- that's enough energy to power the city of San Francisco for over 11 years. Independent studies showed that Nest saved people an average of 10% to 12% on heating and 15% on cooling. Nest thermostats help control residential heating and cooling systems, reduce home energy consumption, and help achieve collective savings. Some Nest thermostats use learning algorithms and smart control of the heating and cooling systems to reduce home energy consumption and the associated Scope 1 and Scope 2 emissions. Nest is also working closely with energy companies to bring low-cost Nest Thermostats to customers through programs that seek to improve energy management and savings opportunities for users, as well as improve the operations of the energy grid as many utilities move towards more energy efficient and renewable technologies. For more information on how Nest helps users save energy, see: - Nest Learning Thermostat Overview: [https://store.google.com/us/product/nest\\_learning\\_thermostat\\_3rd\\_gen?hl=en-US](https://store.google.com/us/product/nest_learning_thermostat_3rd_gen?hl=en-US) - Nest Power Project: <https://nestpowerproject.withgoogle.com> - Impact: <https://nest.com/downloads/press/documents/nest-corporate-fact-sheet.pdf> - Rush Hour Rewards (helps reduce the load on the electrical grid during times when demand for energy is high): <https://nest.com/support/article/What-is-Rush-Hour-Rewards> - Seasonal Savings: <https://nest.com/support/article/What-is-Seasonal-Savings> - Google Nest Help: Learn about Eco Temperatures and how to change settings: <https://support.google.com/googlenest/answer/9245535?hl=en>

**Level of aggregation**

Product



**Description of product/Group of products**

Google Maps: Google Maps assists people as they navigate, explore and get things done in the world.

**Are these low-carbon product(s) or do they enable avoided emissions?**

Avoided emissions

**Taxonomy, project or methodology used to classify product(s) as low-carbon or to calculate avoided emissions**

Other, please specify (Our own methodology)

**% revenue from low carbon product(s) in the reporting year****% of total portfolio value**

<Not Applicable>

**Asset classes/ product types**

<Not Applicable>

**Comment**

Avoided emissions represent the third party's Scope 1 emissions. Several features in Google Maps help people reduce their personal carbon footprint by facilitating use of alternate forms of transportation. With Google Maps you can pinpoint the places and information you need quickly, whether it's how many minutes until the next bus arrives, or how long it will take to walk or bike from work to home. On average, Google Maps provides more than 1 billion km worth of transit results every day. Google Maps has transit information for more than 12,000 agencies, running through more than 4.6 million transit stations, in over 110 countries. Google Maps makes it easier to weigh every transportation option with real-time information. Users can search for information about electric vehicle charging stations, view live traffic delays for buses, public transit crowdedness predictions, bikeshare information, scooter availability, and first- or last-mile transit directions paired with biking and ridesharing. For more information, see our blog posts about transit options, real-time bikeshare information, and EV charging stations on Google Maps: - <https://blog.google/products/maps/hop-on-boardand-go-almost-anywherewith/> - <https://blog.google/products/maps/travel-your-first-and-last-mile-google-maps/> - <https://www.blog.google/products/maps/real-time-bikeshare-information-google-map/> - <https://www.blog.google/products/maps/finding-place-charge-your-ev-easy-google-maps/>

**Level of aggregation**

Product

**Description of product/Group of products**

Project Sunroof

**Are these low-carbon product(s) or do they enable avoided emissions?**

Avoided emissions

**Taxonomy, project or methodology used to classify product(s) as low-carbon or to calculate avoided emissions**

Other, please specify (Our own methodology)

**% revenue from low carbon product(s) in the reporting year****% of total portfolio value**

<Not Applicable>

**Asset classes/ product types**

<Not Applicable>

**Comment**

Avoided emissions represent the third party's Scope 1 and/or Scope 2 emissions. Project Sunroof is a Google product that helps its users decide whether or not to go solar. If a user enters their address on the Project Sunroof site, Google will use 3D mapping of rooftops and nearby obstructions to estimate potential solar energy production if they were to install a rooftop solar system. Project Sunroof combines this production estimate with detailed, localized information about weather, utility rates, solar costs, and incentives to generate an accurate estimate of the financial benefits of going solar. The product also makes it easy for users to connect with solar installers and take the next step towards going solar. As an example of helping users avoid emissions, Google's Project Sunroof data was used by the City of San José, CA for their city-wide solar assessment to achieve a proposed 1GW target and global partners like E.On have deployed Sunroof to help over 10,000 customers understand their roof's solar potential. Project Sunroof contains more than 170 million mapped rooftops across 21,500 cities globally, and we've made this information available on [www.google.com/get/sunroof](http://www.google.com/get/sunroof), [insights.sustainability.google](https://insights.sustainability.google), and on partner sites around the world. For more information, see: <https://www.google.com/get/sunroof>

**Level of aggregation**

Product

**Description of product/Group of products**

Project Air View

**Are these low-carbon product(s) or do they enable avoided emissions?**

Avoided emissions

**Taxonomy, project or methodology used to classify product(s) as low-carbon or to calculate avoided emissions**

Other, please specify (Our own methodology)

**% revenue from low carbon product(s) in the reporting year****% of total portfolio value**

<Not Applicable>

**Asset classes/ product types**

<Not Applicable>

**Comment**

Avoided emissions represent the third party's Scope 1 and/or Scope 2 emissions. Launched in 2014, Project Air View measures air quality data by using Google Street View cars equipped with air quality sensors. In 2019, Project Air View increased its air quality mapping efforts, expanding beyond the United States to map air quality in Copenhagen, Denmark; London, United Kingdom; and Amsterdam, the Netherlands. We're enabling 50 more Street View cars with Aclima's mobile air sensors. Hyperlocal air quality maps for Copenhagen and London were launched in 2019 in the Environmental Insights Explorer Labs: <https://insights.sustainability.google/labs>.

**Level of aggregation**

Product

**Description of product/Group of products**

**Are these low-carbon product(s) or do they enable avoided emissions?**

Avoided emissions

**Taxonomy, project or methodology used to classify product(s) as low-carbon or to calculate avoided emissions**

Other, please specify (Our own methodology)

**% revenue from low carbon product(s) in the reporting year**

**% of total portfolio value**

<Not Applicable>

**Asset classes/ product types**

<Not Applicable>

**Comment**

Avoided emissions represent the third party's Scope 1 and 2 emissions. In 2018, we launched the Environmental Insights Explorer (EIE), an online tool designed to make it easier for cities to access, and act upon, new climate-relevant datasets. EIE uses exclusive data sources and modeling capabilities in a freely available platform to help cities measure emission sources, run analyses, and identify strategies to reduce emissions — creating a foundation for effective action. In 2020, the Environmental Insights Explorer expanded to more than 200 global cities that are using the insights to take action to mitigate carbon emissions. As of the end of 2019, more than 10,000 cities have made commitments through the Global Covenant of Mayors to take action on climate change, with a potential annual reduction of over 2.3 gigatons of CO<sub>2</sub>e. By providing cities with unique insights focused on climate action, we've seen cities from Dublin, Ireland, to Boulder, Colorado, to Kyoto, Japan develop or accelerate their climate programs. In 2020, we committed to help more than 500 cities and local governments reduce an aggregate of 1 gigaton of carbon emissions annually by 2030. For more information, see [insights.sustainability.google](https://insights.sustainability.google) and blog posts and case studies on Medium: <https://medium.com/google-earth/environmental-insights-explorer/home>

---

## C5. Emissions methodology

---

### C5.1

**(C5.1) Provide your base year and base year emissions (Scopes 1 and 2).**

**Scope 1**

**Base year start**

January 1 2009

**Base year end**

December 31 2009

**Base year emissions (metric tons CO<sub>2</sub>e)**

10919

**Comment**

**Scope 2 (location-based)**

**Base year start**

January 1 2009

**Base year end**

December 31 2009

**Base year emissions (metric tons CO<sub>2</sub>e)**

1147991

**Comment**

**Scope 2 (market-based)**

**Base year start**

January 1 2009

**Base year end**

December 31 2009

**Base year emissions (metric tons CO<sub>2</sub>e)**

1147991

**Comment**

---

### C5.2

**(C5.2) Select the name of the standard, protocol, or methodology you have used to collect activity data and calculate emissions.**

The Greenhouse Gas Protocol: A Corporate Accounting and Reporting Standard (Revised Edition)

---

## C6. Emissions data

## C6.1

---

**(C6.1) What were your organization's gross global Scope 1 emissions in metric tons CO2e?**

**Reporting year**

**Gross global Scope 1 emissions (metric tons CO2e)**

38694

**Start date**

<Not Applicable>

**End date**

<Not Applicable>

**Comment**

## C6.2

---

**(C6.2) Describe your organization's approach to reporting Scope 2 emissions.**

**Row 1**

**Scope 2, location-based**

We are reporting a Scope 2, location-based figure

**Scope 2, market-based**

We are reporting a Scope 2, market-based figure

**Comment**

## C6.3

---

**(C6.3) What were your organization's gross global Scope 2 emissions in metric tons CO2e?**

**Reporting year**

**Scope 2, location-based**

5865095

**Scope 2, market-based (if applicable)**

911415

**Start date**

<Not Applicable>

**End date**

<Not Applicable>

**Comment**

## C6.4

---

**(C6.4) Are there any sources (e.g. facilities, specific GHGs, activities, geographies, etc.) of Scope 1 and Scope 2 emissions that are within your selected reporting boundary which are not included in your disclosure?**

No

## C6.5

---

**(C6.5) Account for your organization's gross global Scope 3 emissions, disclosing and explaining any exclusions.**

## Purchased goods and services

### Evaluation status

Relevant, calculated

### Metric tonnes CO2e

0

### Emissions calculation methodology

We estimate GHG emissions from manufacturing Alphabet consumer devices, and include the estimates in the totals reported in "Capital Goods" and "Other (upstream)", along with the descriptions of the methodologies included in the sections below. We factor our food program into this category. We conduct the estimate using procurement data from Bay Area cafes and microkitchens as a proxy for our global operations. We use LCA emission factors sourced from publicly available datasets recommended by WRI and combine them with annual Bay Area procurement volumes. We then extrapolate to our global operations using seated headcount as a scaling factor. The quality of the estimate is likely moderate, as supplier-specific LCA figures were not collected and regional differences in procurement were not captured in the assessment. Note: This program was impacted due to the global pandemic in 2020. We are not breaking this data out specifically for business reasons. The total is included in the "Other (upstream)" category below.

### Percentage of emissions calculated using data obtained from suppliers or value chain partners

### Please explain

## Capital goods

### Evaluation status

Relevant, calculated

### Metric tonnes CO2e

1809000

### Emissions calculation methodology

To calculate GHG emissions from manufacturing capital goods and consumer devices, where a number of suppliers support multiple organizations and Bets within Alphabet, we collected supplier Scope 1 and 2 GHG emissions data directly from our hardware contract manufacturers and component suppliers through the CDP Supply Chain Program. These suppliers represent our key "Tier 1" suppliers who are manufacturing suppliers with whom we have a direct relationship. GHG emissions were estimated by using supplier reported GHG intensity data (per revenue) and Alphabet's spend data, and scaled up with total spend to represent 100% of the spend. For fabless suppliers, Scope 1 and 2 emissions were estimated using supplier reported GHG intensity data (per revenue) and Alphabet's spend data, and supplier Scope 3 data was used when reported. Data gaps were estimated with USEEIO's industry average intensities and spend. GHG emissions beyond our Tier 1 hardware manufacturing suppliers are included in the "Other (upstream)" category below. Data center construction emissions were estimated by using published construction emissions data and applying it to our construction activity data. Given the lack of high-quality data on embodied emissions of hardware, equipment and buildings, the estimates are of only moderate quality.

### Percentage of emissions calculated using data obtained from suppliers or value chain partners

68

### Please explain

## Fuel-and-energy-related activities (not included in Scope 1 or 2)

### Evaluation status

Not relevant, calculated

### Metric tonnes CO2e

0

### Emissions calculation methodology

For fuel and energy related Scope 3 emissions, we performed an analysis of our total energy consumed using life cycle inventory (LCI) and Environmentally Extended Input-Output (EEIO) datasets. The quality of this estimate is likely moderate to low, as the upstream fuel and energy activities' LCI and EEIO data might not be fully representative of the specific and current energy generation technologies and geographies where we operate.

### Percentage of emissions calculated using data obtained from suppliers or value chain partners

### Please explain

We estimated that the emissions associated with fuel-and-energy-related activities not covered in our Scope 1 and 2 are de minimis relative to our overall footprint.

## Upstream transportation and distribution

### Evaluation status

Relevant, calculated

### Metric tonnes CO2e

505000

### Emissions calculation methodology

We calculated GHG emissions from transportation and warehousing of our consumer products, data center equipment, and Google Shopping deliveries by third party logistics providers, both inbound and outbound, paid for by Alphabet. Some transportation providers reported customer-allocated GHG emissions that they calculated aligned with the GHG Protocol based on fuel use or weight-distance data and routing associated with a shipment. We used activity data (weight and distance by shipment) obtained from the providers to estimate GHG emissions from the other transportation providers, and estimated based on the number of units shipped to fill gaps. When available we obtained energy data directly from the warehouses and estimated emissions using electricity and fuel factors. In cases where data was not available, electricity and natural gas use in warehousing were estimated using average energy consumption per square foot from the 2012 Commercial Buildings Energy Consumption Survey (CBECS) and then multiplied by the square feet allocated from the warehouse to Alphabet. This excluded any refrigerants, and also likely overestimated natural gas use.

### Percentage of emissions calculated using data obtained from suppliers or value chain partners

89

### Please explain

## Waste generated in operations

### Evaluation status

Not relevant, explanation provided

### Metric tonnes CO2e

<Not Applicable>

### Emissions calculation methodology

<Not Applicable>

### Percentage of emissions calculated using data obtained from suppliers or value chain partners

<Not Applicable>

### Please explain

For the emissions associated with waste generated in our operations, we performed an analysis using our annual spend and annual waste generation, and used life cycle inventories (LCI) and Environmentally Extended Input-Output (EEIO) datasets to estimate the total emissions. Overall, the data quality is estimated to be low, as the LCI and EEIO datasets might not be fully representative of the geographies and technologies used in the counties and municipalities where we operate. Emissions associated with waste from our operations were estimated to be de minimis relative to our overall footprint.

## Business travel

### Evaluation status

Relevant, calculated

### Metric tonnes CO2e

111000

### Emissions calculation methodology

We estimated business travel and candidate travel using data that includes the distance of each trip and the seating class for air travel and rail travel. We also included data from rental car companies on total fuel consumption from all rental car reservations. Given that our internal data collection for business travel is robust, the quality of the resulting emissions estimate is also likely high. Note: This program was impacted due to the global pandemic in 2020.

### Percentage of emissions calculated using data obtained from suppliers or value chain partners

### Please explain

## Employee commuting

### Evaluation status

Relevant, calculated

### Metric tonnes CO2e

102000

### Emissions calculation methodology

We estimated employee commuting using internal data on employees and applying the average one-way commuting distance and average passenger vehicle fuel economy from U.S. government data sources. We excluded trips made by our shuttles, vanpools, and self-powered commuters (walking, biking, etc.) as these commuting emissions were captured in Scope 1 emissions or are 0. We also excluded commuters using electric vehicles within this calculation (as EV charging on Google campuses is part of our Scope 2). This estimate is based on the best available data at the time of our calculation including the use of a US-average commute estimate. Note: This program was impacted due to the global pandemic in 2020. This category also reflects emissions associated with employee telecommuting (otherwise known as "work-from-home") during the global pandemic in 2020.

### Percentage of emissions calculated using data obtained from suppliers or value chain partners

### Please explain

## Upstream leased assets

### Evaluation status

Not relevant, explanation provided

### Metric tonnes CO2e

<Not Applicable>

### Emissions calculation methodology

<Not Applicable>

### Percentage of emissions calculated using data obtained from suppliers or value chain partners

<Not Applicable>

### Please explain

We do not have significant emissions from upstream leased assets.

## Downstream transportation and distribution

### Evaluation status

Relevant, calculated

### Metric tonnes CO2e

0

### Emissions calculation methodology

We estimated downstream transportation and distribution for those Alphabet activities that we estimated to be significant compared to our overall footprint. We used internal shipment data and emission estimates provided by transportation vendors. Overall, the quality of this data is estimated to be moderate. We included outbound transportation (paid by Alphabet) in the "upstream transportation and distribution" category.

### Percentage of emissions calculated using data obtained from suppliers or value chain partners

### Please explain

## Processing of sold products

### Evaluation status

Not relevant, explanation provided

### Metric tonnes CO<sub>2</sub>e

<Not Applicable>

### Emissions calculation methodology

<Not Applicable>

### Percentage of emissions calculated using data obtained from suppliers or value chain partners

<Not Applicable>

### Please explain

We do not sell intermediate goods that require further processing.

## Use of sold products

### Evaluation status

Relevant, calculated

### Metric tonnes CO<sub>2</sub>e

0

### Emissions calculation methodology

The GHG emissions from use of sold products were calculated for all of Google's flagship products sold in 2020. Use impact was calculated through laboratory power draw measurements and common industry assumptions of use patterns. We use the best data available at the time of calculation. The quality of the estimate is likely moderate to good, given that assumptions of use patterns might not be fully representative of actual use patterns. We are not breaking this data out specifically for business reasons. The total is included in the "Other (upstream)" category below.

### Percentage of emissions calculated using data obtained from suppliers or value chain partners

### Please explain

Since 2017, we have conducted life-cycle assessment (LCA) studies for our flagship products and produced product-level carbon footprints broken out by life cycle stages (including use phase). These are included in the product environmental reports published on the Google Store Sustainability site (<https://store.google.com/us/magazine/sustainability>) and the Google Sustainability site (<https://sustainability.google>).

## End of life treatment of sold products

### Evaluation status

Relevant, calculated

### Metric tonnes CO<sub>2</sub>e

0

### Emissions calculation methodology

We calculated emissions associated with the end-of-life treatment of sold products through our life cycle assessment process and we will continue to expand this assessment over time. Our initial assessments identify this category to be one that does not have significant life cycle impact. We continue to develop programs to extend the life of our sold products and also to ensure efficient management of end-of-life materials. We are not breaking this data out specifically for business reasons. The total is included in the "Other (upstream)" category below.

### Percentage of emissions calculated using data obtained from suppliers or value chain partners

### Please explain

## Downstream leased assets

### Evaluation status

Not relevant, explanation provided

### Metric tonnes CO<sub>2</sub>e

<Not Applicable>

### Emissions calculation methodology

<Not Applicable>

### Percentage of emissions calculated using data obtained from suppliers or value chain partners

<Not Applicable>

### Please explain

We do not have significant emissions from downstream leased assets.

## Franchises

### Evaluation status

Not relevant, explanation provided

### Metric tonnes CO<sub>2</sub>e

<Not Applicable>

### Emissions calculation methodology

<Not Applicable>

### Percentage of emissions calculated using data obtained from suppliers or value chain partners

<Not Applicable>

### Please explain

We do not have franchises.

**Investments**

**Evaluation status**

Not relevant, explanation provided

**Metric tonnes CO2e**

<Not Applicable>

**Emissions calculation methodology**

<Not Applicable>

**Percentage of emissions calculated using data obtained from suppliers or value chain partners**

<Not Applicable>

**Please explain**

As defined by the GHG Protocol, we do not have investments relevant to this category.

**Other (upstream)**

**Evaluation status**

Relevant, calculated

**Metric tonnes CO2e**

6849000

**Emissions calculation methodology**

GHG emissions beyond our Tier 1 hardware manufacturing suppliers are included in this category. The estimate was determined by applying a multiplier based on Alphabet's past carbon footprints using Economic Input-Output LCA and consistent with Scope 3 data reported by our suppliers through the CDP Supply Chain Program. There is a high degree of uncertainty with these estimates. The total shown in this category also includes use of sold products, end-of-life treatment of sold products and food production, as described in the respective category notes.

**Percentage of emissions calculated using data obtained from suppliers or value chain partners**

1

**Please explain**

**Other (downstream)**

**Evaluation status**

Not relevant, explanation provided

**Metric tonnes CO2e**

<Not Applicable>

**Emissions calculation methodology**

<Not Applicable>

**Percentage of emissions calculated using data obtained from suppliers or value chain partners**

<Not Applicable>

**Please explain**

We do not have significant emissions from other relevant downstream activities.

C6.7

**(C6.7) Are carbon dioxide emissions from biogenic carbon relevant to your organization?**

Yes

C6.7a

**(C6.7a) Provide the emissions from biogenic carbon relevant to your organization in metric tons CO2.**

|       | CO2 emissions from biogenic carbon (metric tons CO2) | Comment |
|-------|--|---------|
| Row 1 | 5417   |         |

C6.10

**(C6.10) Describe your gross global combined Scope 1 and 2 emissions for the reporting year in metric tons CO2e per unit currency total revenue and provide any additional intensity metrics that are appropriate to your business operations.**

**Intensity figure**

0.00000521

**Metric numerator (Gross global combined Scope 1 and 2 emissions, metric tons CO2e)**

950109

**Metric denominator**

unit total revenue

**Metric denominator: Unit total**

182527000000

**Scope 2 figure used**

Market-based

**% change from previous year**

2.19

**Direction of change**

Decreased

**Reason for change**

As a large and complex multi-national company, it's not possible to determine the exact cause of year-over-year changes in emissions or emissions intensity. In 2020, our wind and solar deals, together with the RE that comes from the grid, produced enough renewable energy to match 100% of the electricity consumption of our offices, data centers, and networking infrastructure for the fourth consecutive year. In addition, we continue to deliver more and better services and products to more users using less energy and fewer emissions. We also operate our data centers and offices more efficiently (See: <https://www.google.com/about/datacenters/efficiency/>). Despite an increase in our total procurement of renewable energy in 2020 to match 100% of the electricity consumption of our operations, we have a few data center locations (i.e. Singapore) on grids where we are not currently able to source large volumes of renewable energy or where we are not currently able to source renewable energy. Our operations at some of these sites grew in 2020, which resulted in a slight increase in our total market-based Scope 2 emissions. However, due to an increase in unit total revenue in 2020, a decrease in the amount of combined Scope 1 and 2 emissions per unit of total revenue has been achieved. This revenue intensity figure was calculated by taking our combined 2020 Scope 1 and market-based Scope 2 emissions divided by our total revenue for fiscal year 2020. Because of our emissions-reduction efforts, our carbon intensity has steadily decreased even as our company has grown and our energy use has correspondingly increased. Since 2011, our carbon intensity per unit of revenue decreased by 87%.

**Intensity figure**

7.49

**Metric numerator (Gross global combined Scope 1 and 2 emissions, metric tons CO2e)**

950109

**Metric denominator**

full time equivalent (FTE) employee

**Metric denominator: Unit total**

126887

**Scope 2 figure used**

Market-based

**% change from previous year**

6.26

**Direction of change**

Decreased

**Reason for change**

As a large and complex multi-national company, it's not possible to determine the exact cause of year-over-year changes in emissions or emissions intensity. In 2020, our wind and solar deals, together with the RE that comes from the grid, produced enough renewable energy to match 100% of the electricity consumption of our offices, data centers, and networking infrastructure for the fourth consecutive year. In addition, we continue to deliver more and better services and products to more users using less energy and fewer emissions. We also operate our data centers and offices more efficiently (See: <https://www.google.com/about/datacenters/efficiency/>). Despite an increase in our total procurement of renewable energy in 2020 to match 100% of the electricity consumption of our operations, we have a few data center locations (i.e. Singapore) on grids where we are not currently able to source large volumes of renewable energy or where we are not currently able to source renewable energy. Our operations at some of these sites grew in 2020, which resulted in a slight increase in our total market-based Scope 2 emissions. However, due to an increase in the number of employees in 2020, a decrease in the amount of combined Scope 1 and 2 emissions per employee has been achieved. This FTE employee intensity figure was calculated by taking our combined 2020 Scope 1 and market-based Scope 2 emissions divided by our average 2020 headcount. Because of our emissions-reduction efforts, our carbon intensity has steadily decreased even as our company has grown and our energy use has correspondingly increased. Since 2011, our carbon intensity per FTE employee decreased by 86%.

**Intensity figure**

0.0615

**Metric numerator (Gross global combined Scope 1 and 2 emissions, metric tons CO2e)**

950109

**Metric denominator**

Other, please specify (megawatt hour (MWh) of energy consumed)

**Metric denominator: Unit total**

15439538

**Scope 2 figure used**

Market-based

**% change from previous year**

9.74

**Direction of change**

Decreased

**Reason for change**

As a large and complex multi-national company, it's not possible to determine the exact cause of year-over-year changes in emissions or emissions intensity. In 2020, our wind and solar deals, together with the RE that comes from the grid, produced enough renewable energy to match 100% of the electricity consumption of our offices, data centers, and networking infrastructure for the fourth consecutive year. In addition, we continue to deliver more and better services and products to more users using less energy and fewer emissions. We also operate our data centers and offices more efficiently (See: <https://www.google.com/about/datacenters/efficiency/>). We calculated the FY2020 intensity figure by taking the 2020 Scope 1 and market-based Scope 2 emissions total divided by total energy consumption (MWh) in 2020.



C7. Emissions breakdowns

C7.1

(C7.1) Does your organization break down its Scope 1 emissions by greenhouse gas type?

Yes

C7.1a

(C7.1a) Break down your total gross global Scope 1 emissions by greenhouse gas type and provide the source of each used greenhouse warming potential (GWP).

| Greenhouse gas | Scope 1 emissions (metric tons of CO2e) | GWP Reference   |
|----------------|---|---|
| CO2            | 38694                                   | IPCC Fourth Assessment Report (AR4 - 100 year)<br><i>Scope 1 emissions reported as CO2 includes three greenhouse gases: CO2, CH4, and N2O. Carbon dioxide, methane and nitrous oxide emissions are included within our gross global emissions. Due to the nature of our emissions calculation and aggregation processes, it is not feasible to disclose the breakdown of total emissions for each greenhouse gas. Therefore, the emissions are aggregated and reported in carbon dioxide equivalent (CO2e) collectively in the CO2 line in C7.1a.</i> |

C7.2

(C7.2) Break down your total gross global Scope 1 emissions by country/region.

| Country/Region                        | Scope 1 emissions (metric tons CO2e) |
|---------------------------------------|--------------------------------------|
| United States of America              | 27167                                |
| Other, please specify (Rest of world) | 11527                                |

C7.3

(C7.3) Indicate which gross global Scope 1 emissions breakdowns you are able to provide.

C7.5

(C7.5) Break down your total gross global Scope 2 emissions by country/region.

| Country/Region                        | Scope 2, location-based (metric tons CO2e) | Scope 2, market-based (metric tons CO2e) | Purchased and consumed electricity, heat, steam or cooling (MWh) | Purchased and consumed low-carbon electricity, heat, steam or cooling accounted for in Scope 2 market-based approach (MWh) |
|---------------------------------------|--|--|--|--|
| United States of America              | 4340439                                    | 101525                                   | 10849444   | 10367756   |
| Other, please specify (Rest of world) | 1524656                                    | 809890                                   | 4408251  | 2748910  |

C7.6

(C7.6) Indicate which gross global Scope 2 emissions breakdowns you are able to provide.

C7.9

(C7.9) How do your gross global emissions (Scope 1 and 2 combined) for the reporting year compare to those of the previous reporting year?

Increased

C7.9a

**(C7.9a) Identify the reasons for any change in your gross global emissions (Scope 1 and 2 combined), and for each of them specify how your emissions compare to the previous year.**

|   | Change in emissions (metric tons CO2e) | Direction of change | Emissions value (percentage) | Please explain calculation   |
|---|--|---------------------|------------------------------|--|
| Change in renewable energy consumption  | 630998                                 | Decreased           | 73                           | The impact of emission reduction due to the increase in renewable energy consumption in 2020 is a 73% reduction compared to the emissions we reported last year. In 2020, our additional renewable power purchases (in excess of our 2019 renewable power purchases) resulted in an additional reduction of 630,998 tCO2e beyond our 2019 emissions reduction from renewable energy consumption. In 2019, our total Scope 1 and market-based Scope 2 emissions were 860,953 tCO2e. Therefore we arrived at this percentage decrease as follows: $(630,998 / 860,953) \times 100 = 73\%$ . Since 2011, our renewable energy purchasing has resulted in emissions savings of more than 20 million tCO2e—a cumulative 63% reduction in our Scope 1 and 2 emissions over this period.  |
| Other emissions reduction activities    | 21372                                  | Decreased           | 2                            | In addition to our renewable energy purchases, we continued to expand our portfolio of LEED-certified office space as well as to implement other efficiency and emission reduction initiatives, such as making operational improvements to office buildings, improving transportation programs, and encouraging our employees to operate IT equipment more efficiently. We continue to look for ways to increase our use of renewable energy, including trying new, innovative technologies at our offices. In 2020, our energy efficiency efforts resulted in a reduction of 21,372 tCO2e beyond our 2019 emissions reduction activities. In 2019, our total Scope 1 and market-based Scope 2 emissions were 860,953 tCO2e. Therefore we arrived at this percentage decrease as follows: $(21,372 / 860,953) \times 100 = 2\%$ . We believe that our emissions reduction activities are much larger than the savings we are able to quantify from our energy efficiency initiatives. We have done our best to estimate the contribution from our emissions reduction activities, but the actual numbers could be different due to changes in other factors, such as emissions factors and weather. This estimate should be considered a lower bound as it does not include the many small emission reductions projects we've undertaken that are difficult to quantify.                           |
| Divestment                              |  | <Not Applicable >   |                              |  |
| Acquisitions                            |  | <Not Applicable >   |                              |  |
| Mergers                                 |  | <Not Applicable >   |                              |  |
| Change in output                        | 89156                                  | Increased           | 10                           | As a large and complex multi-national company, there are many factors impacting our emissions and it's not possible to isolate any one particular factor and quantify it exactly. Based upon the comparison of 2019 to 2020 reported data, growth of our business created a 10% increase in our emissions compared to the emissions we reported last year. This change in output was calculated by taking our 2020 Scope 1 and market-based Scope 2 emissions minus the 2019 Scope 1 and market-based Scope 2 emissions, divided by the 2019 Scope 1 and market-based Scope 2 emissions, then multiplied by 100. Therefore we arrived at this percentage increase as follows: $(89,156 / 860,953) \times 100 = 10\%$ . This percent change would also be approximately a 14% increase if it were calculated using our location-based Scope 2 emissions. Despite an increase in our total procurement of renewable energy in 2020 to match 100% of the electricity consumption of our operations, we have a few data center locations (i.e. Singapore) on grids where we are currently not able to source large volumes of renewable energy or where we are currently not able to source renewable energy. Our operations at some of these sites grew last year, resulting in a slight increase in our total market-based Scope 2 emissions. This is one contributor to this increase in emissions. |
| Change in methodology                   |  | <Not Applicable >   |                              |  |
| Change in boundary                      |  | <Not Applicable >   |                              |  |
| Change in physical operating conditions |  | <Not Applicable >   |                              |  |
| Unidentified                            |  | <Not Applicable >   |                              |  |
| Other                                   |  | <Not Applicable >   |                              |  |

**C7.9b**

**(C7.9b) Are your emissions performance calculations in C7.9 and C7.9a based on a location-based Scope 2 emissions figure or a market-based Scope 2 emissions figure?**

Market-based

**C8. Energy**

**C8.1**

**(C8.1) What percentage of your total operational spend in the reporting year was on energy?**

More than 0% but less than or equal to 5%

**C8.2**

**(C8.2) Select which energy-related activities your organization has undertaken.**

|  | Indicate whether your organization undertook this energy-related activity in the reporting year |
|--|---|
| Consumption of fuel (excluding feedstocks)         | Yes   |
| Consumption of purchased or acquired electricity   | Yes   |
| Consumption of purchased or acquired heat          | Yes   |
| Consumption of purchased or acquired steam         | No  |
| Consumption of purchased or acquired cooling       | No  |
| Generation of electricity, heat, steam, or cooling | Yes   |

**C8.2a**

**(C8.2a) Report your organization's energy consumption totals (excluding feedstocks) in MWh.**

|   | Heating value             | MWh from renewable sources | MWh from non-renewable sources | Total (renewable and non-renewable) MWh |
|---|---------------------------|----------------------------|--------------------------------|---|
| Consumption of fuel (excluding feedstock)               | LHV (lower heating value) | 19769                      | 162074                         | 181843                                  |
| Consumption of purchased or acquired electricity        | <Not Applicable>          | 13116666                   | 2009031                        | 15125697                                |
| Consumption of purchased or acquired heat               | <Not Applicable>          | 0                          | 124827                         | 124867                                  |
| Consumption of purchased or acquired steam              | <Not Applicable>          | <Not Applicable>           | <Not Applicable>               | <Not Applicable>                        |
| Consumption of purchased or acquired cooling            | <Not Applicable>          | <Not Applicable>           | <Not Applicable>               | <Not Applicable>                        |
| Consumption of self-generated non-fuel renewable energy | <Not Applicable>          | 7171                       | <Not Applicable>               | 7171                                    |
| Total energy consumption                                | <Not Applicable>          | 13143606                   | 2295932                        | 15439538                                |

**C8.2b**

**(C8.2b) Select the applications of your organization's consumption of fuel.**

|   | Indicate whether your organization undertakes this fuel application |
|---|---|
| Consumption of fuel for the generation of electricity   | Yes   |
| Consumption of fuel for the generation of heat          | Yes   |
| Consumption of fuel for the generation of steam         | No  |
| Consumption of fuel for the generation of cooling       | No  |
| Consumption of fuel for co-generation or tri-generation | Yes   |

**C8.2c**

**(C8.2c) State how much fuel in MWh your organization has consumed (excluding feedstocks) by fuel type.**

**Fuels (excluding feedstocks)**

Other, please specify (Renewable Diesel)

**Heating value**

LHV (lower heating value)

**Total fuel MWh consumed by the organization**

19769

**MWh fuel consumed for self-generation of electricity**

0

**MWh fuel consumed for self-generation of heat**

0

**MWh fuel consumed for self-generation of steam**

<Not Applicable>

**MWh fuel consumed for self-generation of cooling**

<Not Applicable>

**MWh fuel consumed for self-cogeneration or self-trigeneration**

0

**Emission factor**

9.45

**Unit**

kg CO2 per gallon

**Emissions factor source**

US EPA Emission Factor Hub 2020

**Comment**

Biogenic emissions. Emission factor for 100% renewable diesel (i.e. biofuel 100% renewable with no fossil fuels). Renewable Diesel is not used for self-generation.

**Fuels (excluding feedstocks)**

Other, please specify (Diesel / Gas oil)

**Heating value**

LHV (lower heating value)

**Total fuel MWh consumed by the organization**

35886

**MWh fuel consumed for self-generation of electricity**

0

**MWh fuel consumed for self-generation of heat**

0

**MWh fuel consumed for self-generation of steam**

<Not Applicable>

**MWh fuel consumed for self-generation of cooling**

<Not Applicable>

**MWh fuel consumed for self-cogeneration or self-trigeneration**

0

**Emission factor**

10.3

**Unit**

kg CO2e per gallon

**Emissions factor source**

US EPA Emission Factor Hub 2020

**Comment**

Diesel / Gas oil. This emission factor includes the three gases, CO2, CH4, and N2O aggregated into a single value in kg CO2e/gallon, using GWP values from IPCC AR4. Diesel / Gas oil is used for self-generation of electricity and transportation, however, it is not broken out.

---

**Fuels (excluding feedstocks)**

Jet Kerosene

**Heating value**

LHV (lower heating value)

**Total fuel MWh consumed by the organization**

19266

**MWh fuel consumed for self-generation of electricity**

0

**MWh fuel consumed for self-generation of heat**

0

**MWh fuel consumed for self-generation of steam**

<Not Applicable>

**MWh fuel consumed for self-generation of cooling**

<Not Applicable>

**MWh fuel consumed for self-cogeneration or self-trigeneration**

0

**Emission factor**

9.78

**Unit**

kg CO2e per gallon

**Emissions factor source**

US EPA Emission Factor Hub 2020

**Comment**

This emission factor includes the three gases, CO2, CH4, and N2O aggregated into a single value in kg CO2e/gallon, using GWP values from IPCC AR4. Jet Kerosene is not used for self-generation.

---

**Fuels (excluding feedstocks)**

Motor Gasoline

**Heating value**

LHV (lower heating value)

**Total fuel MWh consumed by the organization**

29094

**MWh fuel consumed for self-generation of electricity**

0

**MWh fuel consumed for self-generation of heat**

0

**MWh fuel consumed for self-generation of steam**

<Not Applicable>

**MWh fuel consumed for self-generation of cooling**

<Not Applicable>

**MWh fuel consumed for self-cogeneration or self-trigeneration**

0

**Emission factor**

8.81

**Unit**

kg CO2e per gallon

**Emissions factor source**

US EPA Emission Factor Hub 2020

**Comment**

This emission factor includes the three gases, CO2, CH4, and N2O aggregated into a single value in kg CO2e/gallon, using GWP values from IPCC AR4. Motor Gasoline is not used for self-generation.

---

**Fuels (excluding feedstocks)**

Natural Gas

**Heating value**

LHV (lower heating value)

**Total fuel MWh consumed by the organization**

77828

**MWh fuel consumed for self-generation of electricity**

0

**MWh fuel consumed for self-generation of heat**

77828

**MWh fuel consumed for self-generation of steam**

<Not Applicable>

**MWh fuel consumed for self-generation of cooling**

<Not Applicable>

**MWh fuel consumed for self-cogeneration or self-trigeneration**

0

**Emission factor**

1.88

**Unit**

kg CO2e per m3

**Emissions factor source**

The Greenhouse Gas Protocol: A Corporate Accounting and Reporting Standard (Revised Edition)

**Comment**

This emission factor includes the three gases, CO2, CH4, and N2O aggregated into a single value in kg CO2e/m3, using GWP values from IPCC AR4.

---

**C8.2d**

**(C8.2d) Provide details on the electricity, heat, steam, and cooling your organization has generated and consumed in the reporting year.**

|             | Total Gross generation (MWh) | Generation that is consumed by the organization (MWh) | Gross generation from renewable sources (MWh) | Generation from renewable sources that is consumed by the organization (MWh) |
|-------------|------------------------------|---|---|--|
| Electricity | 12846                        | 12846   | 7171  | 7171   |
| Heat        | 77828                        | 77828   | 0   | 0  |
| Steam       | 0                            | 0   | 0   | 0  |
| Cooling     | 0                            | 0   | 0   | 0  |

---

**C8.2e**

**(C8.2e) Provide details on the electricity, heat, steam, and/or cooling amounts that were accounted for at a zero emission factor in the market-based Scope 2 figure reported in C6.3.**

**Sourcing method**

Power purchase agreement (PPA) with a grid-connected generator with energy attribute certificates

**Low-carbon technology type**

Other, please specify (Wind, Solar)

**Country/area of consumption of low-carbon electricity, heat, steam or cooling**

Please select

**MWh consumed accounted for at a zero emission factor**

13116666

**Comment**

Direct procurement contract with a grid-connected generator or Power Purchase Agreement (PPA), supported by energy attribute certificates. Because 'MWh consumed associated with low-carbon electricity' specifies 'consumption', this was calculated using WRI's GHG Scope 2 Protocol rather than Alphabet/Google's accounting method for 100% renewable energy. In 2020, we matched 100% of the electricity consumption of our operations with renewable energy purchases for the fourth consecutive year. The RE purchases come both from PPAs and from the residual renewables already present in the grids we consume electricity from. From 2010 to 2020, Google signed more than 55 agreements to purchase nearly 6 GW of renewable energy across North America, South America, Europe, and Asia, including the United States, Chile, Belgium, Denmark, Finland, Netherlands, Norway, Sweden, Singapore, and Taiwan.

**C9. Additional metrics**

**C9.1**

**(C9.1) Provide any additional climate-related metrics relevant to your business.**

**Description**

Energy usage

**Metric value**

0.1

**Metric numerator**

Noncomputing overhead data center energy use

**Metric denominator (intensity metric only)**

Energy used to power IT equipment

**% change from previous year**

0

**Direction of change**

No change

**Please explain**

Google's data center energy metric is the ratio of noncomputing overhead energy use divided by IT equipment energy use. This ratio was 0.10 in 2019 and 2020, which indicates relatively constant energy efficiency year-over-year. For more than a decade, we've worked to make Google data centers some of the most efficient in the world, improving their environmental performance even as demand for our products has dramatically risen. This metric is closely related to power usage effectiveness (PUE), which is a standard data center industry ratio. PUE compares total data center energy (IT + noncomputing overhead like cooling and power distribution) to IT energy. A PUE of 2.0 means that for every watt of IT power, an additional watt is consumed to cool and distribute power to the IT equipment. A PUE closer to 1.0 means nearly all the energy is used for computing. We measure and monitor PUE vigilantly and Google's data center staff have access to real-time data. Each quarter, we publish PUE data on our public website. For more information, see: <https://www.google.com/about/datacenters/efficiency/> In 2020, the average annual PUE for our global fleet of data centers was 1.10, compared with the industry average of 1.59—meaning that our data centers use about six times less overhead energy.

**C10. Verification**

**C10.1**

**(C10.1) Indicate the verification/assurance status that applies to your reported emissions.**

|  | Verification/assurance status                          |
|--|--|
| Scope 1                                  | Third-party verification or assurance process in place |
| Scope 2 (location-based or market-based) | Third-party verification or assurance process in place |
| Scope 3                                  | Third-party verification or assurance process in place |

**C10.1a**

**(C10.1a) Provide further details of the verification/assurance undertaken for your Scope 1 emissions, and attach the relevant statements.**

**Verification or assurance cycle in place**

Annual process

**Status in the current reporting year**

Complete

**Type of verification or assurance**

Limited assurance

**Attach the statement**

alphabet-fy2020-environmental-indicators-assurance-letter.pdf

**Page/ section reference**

Pages 1 to 4

**Relevant standard**

Attestation standards established by AICPA (AT105)

**Proportion of reported emissions verified (%)**

100

---

**C10.1b**

---

**(C10.1b) Provide further details of the verification/assurance undertaken for your Scope 2 emissions and attach the relevant statements.**

**Scope 2 approach**

Scope 2 location-based

**Verification or assurance cycle in place**

Annual process

**Status in the current reporting year**

Complete

**Type of verification or assurance**

Limited assurance

**Attach the statement**

alphabet-fy2020-environmental-indicators-assurance-letter.pdf

**Page/ section reference**

Pages 1 to 4

**Relevant standard**

Attestation standards established by AICPA (AT105)

**Proportion of reported emissions verified (%)**

100

---

**Scope 2 approach**

Scope 2 market-based

**Verification or assurance cycle in place**

Annual process

**Status in the current reporting year**

Complete

**Type of verification or assurance**

Limited assurance

**Attach the statement**

alphabet-fy2020-environmental-indicators-assurance-letter.pdf

**Page/ section reference**

Pages 1 to 4

**Relevant standard**

Attestation standards established by AICPA (AT105)

**Proportion of reported emissions verified (%)**

100

---

**C10.1c**

---

**(C10.1c) Provide further details of the verification/assurance undertaken for your Scope 3 emissions and attach the relevant statements.**

**Scope 3 category**

Scope 3: Business travel

**Verification or assurance cycle in place**

Annual process

**Status in the current reporting year**

Complete

**Type of verification or assurance**

Limited assurance

**Attach the statement**

alphabet-fy2020-environmental-indicators-assurance-letter.pdf

**Page/section reference**

Pages 1 to 4

**Relevant standard**

Attestation standards established by AICPA (AT105)

**Proportion of reported emissions verified (%)**

100

---

**Scope 3 category**

Scope 3: Employee commuting

**Verification or assurance cycle in place**

Annual process

**Status in the current reporting year**

Complete

**Type of verification or assurance**

Limited assurance

**Attach the statement**

alphabet-fy2020-environmental-indicators-assurance-letter.pdf

**Page/section reference**

Pages 1 to 4

**Relevant standard**

Attestation standards established by AICPA (AT105)

**Proportion of reported emissions verified (%)**

100

---

**C10.2**

---

**(C10.2) Do you verify any climate-related information reported in your CDP disclosure other than the emissions figures reported in C6.1, C6.3, and C6.5?**

Yes

**C10.2a**

---



**(C10.2a) Which data points within your CDP disclosure have been verified, and which verification standards were used?**

| Disclosure module verification relates to | Data verified   | Verification standard  | Please explain  |
|---|---|--|---|
| C6. Emissions data                        | Product footprint verification  | ISO 14040:2006 and ISO 14044:2006  | We produced product environmental reports for all six of our flagship products released in 2020 (Pixel 5, Pixel 4a (5G), Pixel 4a, Nest Audio, Chromecast with Google TV, and the new Nest Thermostat). These are in addition to previously published product environmental reports for products released in earlier years. The reports include carbon footprints based on product life-cycle assessment (LCA) studies, which detail the environmental performance of each product over its full life cycle, from design and manufacturing through usage and recycling. The product environmental reports can be found at <a href="https://sustainability.google/reports/">https://sustainability.google/reports/</a> . The LCA reports underwent and successfully passed critical review by an external individual expert. The critical review checked that: - Methods used to carry out the LCA were consistent with standards ISO 14040 and 14044; - Methods used to carry out the LCA were scientifically and technically valid; - Data used were appropriate and reasonable in relation to the goal of the study; - Interpretations reflected the limitations identified and the goal of the study; - Study documentation was transparent and consistent. Critical review statements can be made available upon request. |
| C6. Emissions data                        | Other, please specify (Carbon intensity metrics)                                  | Attestation standards established by the American Institute of Certified Public Accountants (AICPA) AT-C section 105, Concepts Common to All Attestation Engagements, and AT-C section 210, Review Engagements                     | The following carbon intensity metrics were externally assured as part of our Independent Accountants' Review: - Scope 1 + Scope 2 emissions intensity per unit of revenue - Scope 1 + Scope 2 emissions intensity per full-time equivalent employee (FTE) - Scope 1 + Scope 2 emissions intensity per MWh of energy consumed   |
| C8. Energy                                | Renewable energy products   | Our carbon footprint is externally assured according to the Attestation standards established by AICPA (AT105), however the assurance body does not verify the renewable energy credits (RECs) or the Guarantees of Origin (GOOs). | Our carbon footprint is externally assured. The assurance body does not verify the renewable energy contractual instruments, e.g. renewable energy credits (RECs) or the Guarantees of Origin (GOOs). The assurance process ensures that the renewable energy contractual instruments used in our Scope 2 emissions accounting meet the Scope 2 Quality Criteria outlined in the GHG Protocol Scope 2 Guidance.   |
| C8. Energy                                | Energy consumption  | Attestation standards established by the American Institute of Certified Public Accountants (AICPA) AT-C section 105, Concepts Common to All Attestation Engagements, and AT-C section 210, Review Engagements                     | Total energy consumption is externally assured as part of our Independent Accountants' Review.  |
| C8. Energy                                | Other, please specify (Total electricity consumption)                             | Attestation standards established by the American Institute of Certified Public Accountants (AICPA) AT-C section 105, Concepts Common to All Attestation Engagements, and AT-C section 210, Review Engagements                     | Total electricity consumption is externally assured as part of our Independent Accountants' Review.   |
| C6. Emissions data                        | Other, please specify (Biogenic emissions)  | Attestation standards established by the American Institute of Certified Public Accountants (AICPA) AT-C section 105, Concepts Common to All Attestation Engagements, and AT-C section 210, Review Engagements                     | Our biogenic GHG emissions are externally assured as part of our Independent Accountants' Review.   |
| C8. Energy                                | Other, please specify (Percentage of electricity procured from renewable sources) | Attestation standards established by the American Institute of Certified Public Accountants (AICPA) AT-C section 105, Concepts Common to All Attestation Engagements, and AT-C section 210, Review Engagements                     | Our percentage of electricity procured from renewable energy sources is externally assured as part of our Independent Accountants' Review.  |

**C11. Carbon pricing**

**C11.1**

**(C11.1) Are any of your operations or activities regulated by a carbon pricing system (i.e. ETS, Cap & Trade or Carbon Tax)?**

Yes

**C11.1a**

**(C11.1a) Select the carbon pricing regulation(s) which impacts your operations.**

EU ETS

## C11.1b

---

(C11.1b) Complete the following table for each of the emissions trading schemes you are regulated by.

### EU ETS

**% of Scope 1 emissions covered by the ETS**

9.32

**% of Scope 2 emissions covered by the ETS**

0

**Period start date**

January 1 2020

**Period end date**

December 31 2020

**Allowances allocated**

3606

**Allowances purchased**

3606

**Verified Scope 1 emissions in metric tons CO<sub>2</sub>e**

3606

**Verified Scope 2 emissions in metric tons CO<sub>2</sub>e**

0

**Details of ownership**

Facilities we own and operate

**Comment**

## C11.1d

---

(C11.1d) What is your strategy for complying with the systems you are regulated by or anticipate being regulated by?

Members of Google's data center Environmental Health and Safety, Energy, and Public Policy teams monitor current and emerging energy- and emissions-related regulations related to the EU ETS.

As an example of a case study, the scope of the revised EU ETS legislations covered small emitters and, as a result, our EU data centers were required to apply for ETS Permits. Google has six data centers in Europe. The EU ETS directive requires operators of installations, which are included in the scope to hold a valid GHG emission monitoring plan issued by the relevant Competent Authority, to monitor and report their emissions, to have the reports verified by an independent and accredited verifier, and to purchase and surrender the equivalent number of allowances on an annual basis through approved operators holding accounts on the Union Registry. Our strategy is to continue to follow these directives of the EU ETS. As a result, we are in compliance with the EU ETS.

## C11.2

---

(C11.2) Has your organization originated or purchased any project-based carbon credits within the reporting period?

Yes

## C11.2a

---

**(C11.2a) Provide details of the project-based carbon credits originated or purchased by your organization in the reporting period.**

**Credit origination or credit purchase**

Credit purchase

**Project type**

Landfill gas

**Project identification**

Oneida Herkimer Landfill in Ava, NY (CAR674)

**Verified to which standard**

CAR (The Climate Action Reserve)

**Number of credits (metric tonnes CO2e)**

42679

**Number of credits (metric tonnes CO2e): Risk adjusted volume**

42679

**Credits cancelled**

Yes

**Purpose, e.g. compliance**

Voluntary Offsetting

---

**C11.3**

---

**(C11.3) Does your organization use an internal price on carbon?**

Yes

**C11.3a**

---

**(C11.3a) Provide details of how your organization uses an internal price on carbon.**

**Objective for implementing an internal carbon price**

Other, please specify (Risk assessment)

**GHG Scope**

Scope 2

**Application**

We use carbon prices as part of our risk assessment model, to support strategic decision-making related to future capital investments. For example, the risk assessment at individual data center facilities also includes using a shadow price for carbon to estimate expected future energy costs.

**Actual price(s) used (Currency /metric ton)**

**Variance of price(s) used**

We do not disclose the exact carbon price we use, how we determine it, or its variance as we consider this to be competitive information.

**Type of internal carbon price**

Shadow price

**Impact & implication**

Google faces the risk of increased costs of energy if a price on carbon is applied through legislation such as cap and trade (or other mechanisms such as taxation). To the extent that this price is passed on to us from a regulated entity, the cost of running our operations will increase. However, we already operate some of the most efficient data centers in the world, procure renewable energy for our operations, and generate onsite renewable energy at several of our offices and at our data center in Belgium, all of which reduce our exposure to this risk. In addition, we already include a shadow price for carbon in our data center siting analysis so we take this risk into account even before we build a data center. Finally, we reach carbon neutrality for our operations via three steps: energy efficiency, renewable energy procurement, and purchasing high-quality carbon offsets for any remaining emissions we haven't yet eliminated. As a hypothetical example, if a carbon price of e.g. \$19/metric tonne were established through regulation (median price of carbon/tonne from the May 2021 CA-QC Joint Auction), this could increase our costs by approximately \$18 million, assuming these costs were passed through to electricity consumers and we were not further able to reduce our carbon footprint. This was calculated by adding our 2020 Scope 1 and 2020 Scope 2 market-based emissions, and then multiplying by the aforementioned carbon price example [= (2020 Scope 1 + market-based Scope 2) x \$19]. The financial impact would likely be less as we already voluntarily purchase carbon offsets. Note that this is a hypothetical example and not our actual internal carbon price.

---

**C12. Engagement**

---

**C12.1**

---

**(C12.1) Do you engage with your value chain on climate-related issues?**

Yes, our suppliers

Yes, our customers

Yes, other partners in the value chain

---

## C12.1a

---

### (C12.1a) Provide details of your climate-related supplier engagement strategy.

#### Type of engagement

Engagement & incentivization (changing supplier behavior)

#### Details of engagement

Run an engagement campaign to educate suppliers about climate change  
Climate change performance is featured in supplier awards scheme

#### % of suppliers by number

93

#### % total procurement spend (direct and indirect)

79

#### % of supplier-related Scope 3 emissions as reported in C6.5

80

#### Rationale for the coverage of your engagement

In 2020, our Supplier Responsibility program was directly engaged with 598 active suppliers supporting hardware manufacturing and related services, and professional services. Of those, 558 (93%) active suppliers have signed our Supplier Code of Conduct (SCOC), which forms the basis of our supplier sustainability profile survey and our supplier onsite audits, and articulates our overall requirements for resource efficiency, including energy and emissions. All suppliers are required to sign our SCOC (included in our contracts) and we're working to obtain the remaining signatures and new signatures to our SCOC as we onboard new suppliers. In 2020, our active hardware suppliers who signed our SCOC covered 79% of our total spend and 80% of Scope 3 emissions. Spend is calculated based on our purchase orders with suppliers providing manufacturing services or products. The % Scope 3 emissions metric was estimated for manufacturing emissions from our direct hardware suppliers and excludes full upstream emissions for which we do not have direct supplier relationships. We've integrated sustainability criteria into our supplier sourcing and performance management processes, including assessing suppliers' practices to report, manage and reduce their emissions and incorporating them into our supplier scorecard. The data is also used to help set goals and priorities for our sustainability program by supplier, commodity and region and to verify data, refine allocations and continually improve our analyses of supply chain GHG emissions. In 2020, we continued to refine our assessment of GHG emissions associated with services, such as marketing, professional services, and construction services. In 2020, our Energy Efficiency and Renewable Energy program continued to engage our suppliers to analyze their energy performance and energy management practices in their manufacturing sites, and develop and implement a comprehensive energy efficiency and renewable energy plan to maximize energy savings and payback. In 2020, we committed to invest in and help deploy 5 GW of new clean energy by 2030 in our key supply chain regions. We also collaborated with suppliers and other stakeholders in our value chain on circular economy pathways, and successfully continued our program to build disk drives with recovered rare-earth magnets and quantified the life cycle environmental impacts.

#### Impact of engagement, including measures of success

In 2020, we used the CDP Supply Chain platform and custom surveys to request climate and water data from 193 suppliers and provided individualized feedback on their performance for key KPIs (e.g. emission reduction targets). Our measures of success from engaging our suppliers in GHG emissions reporting and reduction include: response rate, proportion of suppliers reporting GHG emissions, and proportion of suppliers with GHG emissions reduction targets. We consider a response rate of at least 90%, 80% of our suppliers reporting GHG emissions, and 50% of suppliers having a GHG emissions reduction target to be successful. Impact of engagement: In 2020, climate change reporting by our suppliers improved compared to 2019 across all metrics. We invited 9% more suppliers in 2020. We achieved a response rate of 99% to our climate change survey requests, 97% of our suppliers reported at least one source of GHG emissions (Scope 1 and/or Scope 2 emissions) and 73% of our suppliers had set a GHG emissions reduction target.

#### Comment

Our Supplier Code of Conduct can be found at: <https://about.google/supplier-code-of-conduct/>

---

## C12.1b

---

**(C12.1b) Give details of your climate-related engagement strategy with your customers.**

**Type of engagement**

Education/information sharing

**Details of engagement**

Run an engagement campaign to educate customers about the climate change impacts of (using) your products, goods, and/or services

**% of customers by number**

30

**% of customer - related Scope 3 emissions as reported in C6.5**

**Portfolio coverage (total or outstanding)**

<Not Applicable>

**Please explain the rationale for selecting this group of customers and scope of engagement**

Alphabet reports to CDP's Supply Chain program, making our carbon footprint data available to the 42 customers that requested this data from Alphabet for FY2020. We believe that environmental impact should be an important consideration—alongside factors such as price, security, openness, and reliability—when it comes to data storage, processing and development. In 2020, we matched 100% of the electricity consumption of our operations with renewable energy purchases for the fourth consecutive year. Reaching this milestone was important to us, but it also mattered to many of our customers. We operate the cleanest cloud in the industry and are working with a growing group of cloud customers focused on reducing the carbon impact of their operations. We partner with these customers because they are keen to cut carbon emissions, explore new ways to protect the earth's resources, better harness renewable energy, and improve the sustainability of their IT infrastructure. We've helped evaluate customer IT estates and have seen potential net-carbon reductions from a few thousand kilograms of CO<sub>2</sub>e to many kilotons. To help our customers achieve these IT carbon reductions and make decisions about moving to more sustainable data center options, we've shared an average hourly Carbon Free Energy Percentage for the majority of our Google Cloud regions, as well as a Google Cloud region picker. We produce and promote content to our Cloud customers about our sustainability and climate change strategy and performance. For example, our [cloud.google.com/sustainability/](https://cloud.google.com/sustainability/) microsite helps businesses understand the environmental impact of their operations and how switching to Google Cloud can help reduce it. We also publish content on the importance of taking sustainability into account with regards to infrastructure and application development, and we continue to host webinars, virtual roundtables, and executive engagement sessions on cloud sustainability. Our sales teams work with customers to share tools for calculating the potential emissions impact of migrations of applications to the cloud, workshops for architecting applications in the most carbon-free way possible, and best practices to make their IT more sustainable. We also include information on our climate change strategy and performance at annual events such as Google Cloud Next.

**Impact of engagement, including measures of success**

Our measures of success include: unique views for our Google Cloud sustainability microsite (<https://cloud.google.com/sustainability/>) and blogs, message pull-through by media and press, social media impressions from tweets related to this content, attendees at climate-focused Cloud OnAir webinars, and the number of prospective and new customers asking about or mentioning the environmental performance of Google Cloud. We also offer a sustainability presentation to customers who come to our Executive Briefing Center and we have also trained our sales team to communicate these key messages to prospective and existing customers. This engagement has impacted the decision of customers to use Google Cloud products, including National Geographic, Etsy, Spotify, and Lush. For example, we published a blog post in which Etsy's CTO talks about how Google's commitment to sustainability factored into their decision to use Google Cloud Platform (see <https://www.blog.google/products/google-cloud/engineered-renewal-google-cloud-etsy-and-sustainability/>). In the past year we've worked with over 50 customers to evaluate their IT estates for their carbon impact. We've also helped customers reduce their emissions through the use of our carbon-neutral services. For example, National Geographic Partners migrated its entire image library application from its data center to Google Cloud to improve the security and management of the collection. Moving to Google Cloud reduced energy and emissions of the image collection by approximately 62%. (See the presentation from Google Cloud Next '19: <https://www.youtube.com/watch?v=gsAlg8DVIQY&t=11m00s>)

---

C12.1d

**(C12.1d) Give details of your climate-related engagement strategy with other partners in the value chain.**

In addition to engagement with suppliers and customers, we also engage with partners—including businesses, governments, nonprofits, communities, and individuals—on climate-related issues in various capacities.

We engage with organizations that perform research and disseminate public work related to climate change and energy. The Google Earth Outreach (Geo) and Earth Engine teams have helped organizations accelerate climate research. Google created the Earth Outreach program, which works directly with nonprofits and public benefit groups to help them get the mapping resources needed to create knowledge about the environment and communicate it effectively to decision makers.

As an example of a case study, in 2011, Geo partnered with the Environmental Defense Fund (EDF) to measure and map methane leaks under city streets. To do this, we deployed methane analyzers mounted on Google Street View cars to build insights that have helped community groups, utilities, and regulators get a better understanding of methane leaks and identify opportunities for improvements. As a result, New Jersey's PSE&G approved a plan to replace up to 510 miles of old pipe based on this data. We've also mapped other air pollutants with our partners, including carbon dioxide, particulate matter, ozone, nitrogen dioxide, nitrous oxide, and more. In 2017, Geo worked with EDF and Aclima to release heat maps with hyper-local air quality information for three regions in California that contained hundreds of millions of ambient air quality data points measured by the Google Street View cars equipped with air quality sensors. Over three peer-reviewed science articles have been published around this work.

Since then, we've been working with partners around the world to collect data on air quality measurements to help cities understand and take action to improve air quality. In 2019, we partnered with the City of Copenhagen and Amsterdam, and scientists at Utrecht University, to use Google Street View vehicles with scientific instruments to measure air quality at street level. In London, in partnership with the Breathe London project, we published new air quality maps of fine particulate matter (PM 2.5) and nitrogen dioxide.

As part of Google's most ambitious decade of climate action, we've made a commitment to help more than 500 cities and local governments reduce an aggregate of 1 gigaton of carbon emissions per year by 2030. To do this, we'll empower city planners and policymakers with the Environmental Insights Explorer (EIE) to make it easier for cities to measure progress against their climate action plans. (See [insights.sustainability.google](https://insights.sustainability.google)).

In 2020, we expanded EIE data access to thousands of cities worldwide, including more than 100 Australian councils. To scale data access to local governments, policymakers, and community groups, we're developing partnerships with Australian organizations, councils, and climate change experts. This includes a partnership with Ironbark Sustainability and Beyond Zero Emissions to make EIE transportation data available in Snapshot—a free climate tool that calculates major sources of carbon emissions, including stationary energy, transport, waste, agriculture, and land-use change.

Google's products help drive carbon mitigation efforts and inform climate science. Our Google Earth Engine geospatial analysis platform makes more than 40 years of satellite imagery available online so scientists and researchers can analyze real-time changes to the Earth's surface. In 2019, Google and the Group on Earth Observations Secretariat announced a partnership to choose 25 projects to receive licenses for the sustained use of Google Earth Engine in a production environment, to be used by public sector and commercial recipients to tackle significant societal challenges and improve understanding of our planet.

Additionally, Google's tools help further the dissemination of climate information through the Google for Nonprofits program. This program offers eligible nonprofit organizations access to Google tools like Google Workspace (including Gmail, Calendar, and Drive), Google Ad Grants, YouTube for Nonprofits, and Google Maps, all at no charge. This effort aims to support the social impact of nonprofits through easy access to Google's highly efficient products and services. Nonprofits can use Google's free tools to find new donors and volunteers, work efficiently and get supporters to take action on topics like climate change.

These efforts align with our climate change strategy because thousands of environmental nonprofits around the globe use Google for Nonprofits products to engage in research and advocacy in support of environmental goals.

Lastly, Google is an active member of a number of coalitions working to address climate change and provide greater access to renewables. This includes the organizations such as RE100, RE-Source, and the Renewable Energy Buyers Alliance, as well as many others (see CDP Question 12.3c).

**C12.3**

---

**(C12.3) Do you engage in activities that could either directly or indirectly influence public policy on climate-related issues through any of the following?**

- Direct engagement with policy makers
- Trade associations
- Other

**C12.3a**

---

**(C12.3a) On what issues have you been engaging directly with policy makers?**

| Focus of legislation    | Corporate position | Details of engagement  | Proposed legislative solution   |
|-------------------------|--------------------|--|---|
| Clean energy generation | Support            | Google has served as a catalyst for policy change through targeted advocacy at the international, national and state levels. Members of Google's energy and public policy teams have engaged directly with policymakers from the U.S. (including the White House, the U.S. Congress, and Governors), the European Union, and other countries to call for policies that promote renewable energy and/or reduce carbon emissions. In 2020, this included: European Union: - We joined the European Commission's European Climate Pact, calling for action to make Europe the first climate neutral continent by 2050 and complementing the regulatory Green Deal agenda. - We collaborated with other corporate renewable energy buyers and project developers via the RE-Source Platform to develop and advocate a joint policy position to enable Corporate Power Purchase Agreements (CPPAs) to play a greater role in delivering the EU Green Deal. We advocated for the RE-Source Platform to play a stronger role on energy policy advocacy, which contributed to the creation of a dedicated policy working group within RE-Source. - We helped set up a new Green Deal Working Group within Digital Europe which is advocating for policy change to enable digital solutions to support the EU's goal to become a climate neutral continent. - Google joined other corporate renewable energy buyers in signing on to a letter to European Commissioners calling on Europe to use its Covid recovery package to support scaling up of renewable energy, and to ensure that barriers to corporate PPAs are removed. - We continued to support and play an active role on climate topics in the policy working groups of several European trade associations of which Google is a member, including the RE-Source Platform, WindEurope, Solar Power Europe and Eurelectric, advocating for further action from EU policy makers to unlock Europe's renewable energy potential. Asia-Pacific region: - Google joined the Japan Climate Leaders Partnership (JCLP), the leading corporate association advocating for policies to advance corporate renewable energy purchasing in Japan. | More local, regional, national and international policies to reduce dependence on carbon intensive power and support clean energy deployment. Details of engagement continued: U.S. federal climate policy: - We supported trade groups of which we are a member, namely the American Council on Renewable Energy (ACORE), the American Clean Power Association (ACPA), and the Advanced Energy Buyers Group (AEBG), promoting the growth of renewable energy installations and jobs in the United States. -We led the establishment of the Renewable Energy Buyers Alliance (REBA), the world's largest organization of corporate renewable energy buyers. REBA's mission is to create a resilient zero-carbon energy system where every company has a viable, speedy, and cost-effective pathway to renewable energy, to grow the market from 50 buyers today to 50,000 buyers in the years to come. In 2020, a Google representative served as Board Chair of the organization. - In December 2020, we joined with 47 leading companies to urge President-elect Biden and the new Congress to work together to enact ambitious, durable, and bipartisan climate solutions, noting that climate action is a "business imperative" for Google and others. We also joined over 1,500 businesses, cities, states, tribal nations, and other institutions as part of the We Are Still In coalition to call upon the incoming U.S. Administration to align with net-zero emissions by 2050. U.S. state climate and energy policy: - In collaboration with our trade association partners, we supported or led efforts across the country to promote the expansion of competitive wholesale markets including: Successfully passing legislation for energy market expansion efforts in South Carolina, North Carolina, Colorado, and Nevada; defending wholesale market expansion at the Federal Energy Regulatory Commission in the Southeast Energy Exchange Market docket; and introducing wholesale market expansion in multiple pieces of Federal legislation. International climate policy: - We were unable to participate in supporting a global climate outcome at the annual COP in 2020 because COP-26 was postponed to 2021 due to the COVID-19 pandemic. However, we maintained active discussions with the UNFCCC and other organizations to plan for a robust presence at the rescheduled COP in 2021. |

**C12.3b**

**(C12.3b) Are you on the board of any trade associations or do you provide funding beyond membership?**

Yes

**C12.3c**

**(C12.3c) Enter the details of those trade associations that are likely to take a position on climate change legislation.**

**Trade association**

American Council on Renewable Energy (ACORE)

**Is your position on climate change consistent with theirs?**

Consistent

**Please explain the trade association's position**

American Council on Renewable Energy (ACORE) is a 501(c)(3) national nonprofit organization that unites finance, policy and technology to accelerate the transition to a renewable energy economy. ACORE is the focal point for collaborative advocacy across the renewable energy sector. For more information, see <http://www.acore.org/>

**How have you influenced, or are you attempting to influence their position?**

Google is part of many trade associations and has chosen to highlight a select few that are specifically focused on climate and energy issues. We are not on the Board of this trade association and do not provide funding beyond membership. However, we are founding members of the U.S. Partnership for Renewable Energy Finance (US PREF), which is now part of ACORE. We are also a member of the Partnership for Renewable Integration & Market Expansion (PRIME) (<https://acore.org/pref-and-prime/>) and serve on the Leadership Council. We maintain regular engagement with top leadership of the key trade associations in which we are members.

**Trade association**

WRI/WWF Corporate Renewable Energy Buyer's Principles

**Is your position on climate change consistent with theirs?**

Consistent

**Please explain the trade association's position**

The Buyers' Principles tell utilities and other suppliers what industry-leading, multinational companies are looking for when buying renewable energy from the grid. A group of large energy buyers developed these six principles to spur progress on renewable energy and to add their perspective to the future of the U.S. energy and electricity system. For more information, see <http://buyersprinciples.org/>

**How have you influenced, or are you attempting to influence their position?**

Google is part of many trade associations and has chosen to highlight a select few that are specifically focused on climate and energy issues. We are not on the Board of this trade association and do not provide funding beyond membership. However, we maintain regular engagement with top leadership of the key trade associations in which we are members.

**Trade association**

RE100

**Is your position on climate change consistent with theirs?**

Consistent

**Please explain the trade association's position**

RE100 is a global initiative bringing together the world's most influential businesses committed to 100% renewable electricity. Led by the Climate Group and in partnership with CDP, our mission is to accelerate change towards zero carbon grids at scale. For more information, see <http://there100.org/>

**How have you influenced, or are you attempting to influence their position?**

Google is part of many trade associations and has chosen to highlight a select few that are specifically focused on climate and energy issues. Google joined RE100 in December 2015 (see: <https://www.there100.org/our-work/news/google-joins-re100-and-announces-new-investments-wind-and-solar-power-news>). Google is on the Advisory Committee of RE100, which advises RE100 leadership on issues related to strategy and policy engagement. We do not provide funding beyond membership.

---

**Trade association**

North Carolina Sustainable Energy Association (NCSEA)

**Is your position on climate change consistent with theirs?**

Consistent

**Please explain the trade association's position**

North Carolina Sustainable Energy Association (NCSEA) works to enable clean energy jobs, economic opportunities, and affordable energy options for North Carolinians. For more information, see <http://www.energync.org/>

**How have you influenced, or are you attempting to influence their position?**

Google is part of many trade associations and has chosen to highlight a select few that are specifically focused on climate and energy issues. We are not on the Board of this trade association and do not provide funding beyond membership. However, we maintain regular engagement with top leadership of the key trade associations in which we are members.

---

**Trade association**

Carolinas Clean Energy Business Association (CCEBA)

**Is your position on climate change consistent with theirs?**

Consistent

**Please explain the trade association's position**

The Carolinas Clean Energy Business Association (CCEBA) works to strengthen the region's clean energy market – creating a business environment that leverages private sector innovation to achieve a more cost-effective, reliable, and sustainable energy system. CCEBA is an association of independent power producers, suppliers, and customers, who are committed to preserving and expanding private sector market access amidst a vertically integrated utility environment. For more information, see <https://carolinascceba.com/>

**How have you influenced, or are you attempting to influence their position?**

Google is part of many trade associations and has chosen to highlight a select few that are specifically focused on climate and energy issues. Google is on the Board of CCEBA and chairs the CCEBA legislative committee, but does not provide any funding beyond membership.

---

**Trade association**

Advanced Power Alliance

**Is your position on climate change consistent with theirs?**

Consistent

**Please explain the trade association's position**

The Advanced Power Alliance is the industry trade association created to promote the development of wind, solar and energy storage as resources that can deliver clean, reliable, affordable power for American consumers. For more information, see <https://poweralliance.org/>

**How have you influenced, or are you attempting to influence their position?**

Google is part of many trade associations and has chosen to highlight a select few that are specifically focused on climate and energy issues. We are Board Members of the Advanced Power Alliance, but do not provide any funding beyond membership. We participate principally to support clean energy advocacy in the states, Oklahoma and Texas. And, we also participate actively in the group's engagement in ERCOT and SPP.

---

**Trade association**

Advanced Energy Buyers Group

**Is your position on climate change consistent with theirs?**

Consistent

**Please explain the trade association's position**

The Advanced Energy Buyers Group is a coalition of leading advanced energy purchasers, engaging on policies to unlock opportunities for customers to access affordable, reliable, clean, and innovative energy options. For more information, see <https://www.advancedenergybuyersgroup.org/>

**How have you influenced, or are you attempting to influence their position?**

Google is part of many trade associations and has chosen to highlight a select few that are specifically focused on climate and energy issues. Google joined this group in 2017, when it was formed. We are not on the Board of this trade association and do not provide funding beyond membership. However, we maintain regular engagement with top leadership of the key trade associations in which we are members.

---

**Trade association**

WindEurope

**Is your position on climate change consistent with theirs?**

Consistent

**Please explain the trade association's position**

WindEurope is the voice of the wind industry in Europe, actively promoting wind power in Europe and worldwide. They have over 400 members, active in over 35 countries. Their membership comprises wind turbine manufacturers, component suppliers, research institutes, national wind and renewables associations, developers, contractors, electricity providers, finance companies, and buyers of renewable electricity. For more information, see <https://windeurope.org/>

**How have you influenced, or are you attempting to influence their position?**

Google is part of many trade associations and has chosen to highlight a select few that are specifically focused on climate and energy issues. Google joined this group in 2018. We are not on the Board of this trade association and do not provide funding beyond membership. However, we maintain regular engagement with top leadership of the key trade associations in which we are members.

---

**Trade association**

SolarPower Europe



**Is your position on climate change consistent with theirs?**

Consistent

**Please explain the trade association's position**

SolarPower Europe's aim is to ensure that more energy is generated by solar than any other energy source by 2030 and to lead their members to make solar the core of a smart, sustainable, secure and inclusive energy system in order to reach carbon neutrality before 2050. For more information, see <http://www.solarpowereurope.org/>

**How have you influenced, or are you attempting to influence their position?**

Google is part of many trade associations and has chosen to highlight a select few that are specifically focused on climate and energy issues. Google joined this group in 2018. We are not on the Board of this trade association and do not provide funding beyond membership. However, we maintain regular engagement with top leadership of the key trade associations in which we are members.

---

**Trade association**

RE-Source

**Is your position on climate change consistent with theirs?**

Consistent

**Please explain the trade association's position**

The RE-Source Platform is Europe's leading forum for corporate renewable energy sourcing. Through its wide-ranging and innovative Buyers Toolkit and popular annual event for energy buyers and sellers, RE-Source seeks to remove barriers for corporates to renewable energy procurement in support of Europe's climate and energy goals. For more information, see <http://resource-platform.eu/>

**How have you influenced, or are you attempting to influence their position?**

Google is part of many trade associations and has chosen to highlight a select few that are specifically focused on climate and energy issues. Google was actively involved in the creation of the RE-Source Platform and is one of its founding Strategic Partners and a member of the Steering Group. Google also sponsored the annual RE-Source conference in Amsterdam in 2019, which brought together over 800 government officials and business leaders dedicated to accelerating corporate purchasing of renewable energy in Europe.

---

**Trade association**

Renewable Energy Buyers Alliance (REBA)

**Is your position on climate change consistent with theirs?**

Consistent

**Please explain the trade association's position**

REBA is an alliance of large clean energy buyers, energy providers, and service providers that, together with NGO partners, are unlocking the marketplace for all nonresidential energy buyers to lead a rapid transition to a cleaner, prosperous, zero-carbon energy future. For more information, see <https://rebuyers.org/>

**How have you influenced, or are you attempting to influence their position?**

Google is part of many trade associations and has chosen to highlight a select few that are specifically focused on climate and energy issues. Google was actively involved in the creation of this national trade organization in 2018, serving as the chair of the Interim Board of Directors during the transition from an NGO-led effort into a corporate-led trade organization. Google also provided financial support for the development of the organization. In 2020, a Google representative served as the Board Chair of this organization.

---

**Trade association**

American Clean Power Association (ACPA)

**Is your position on climate change consistent with theirs?**

Consistent

**Please explain the trade association's position**

The American Clean Power Association (ACPA) is the leading federation of renewable energy companies expediting the advancement of clean energy as the dominant power source in America. For more information, see <https://www.cleanpower.org>

**How have you influenced, or are you attempting to influence their position?**

Google is part of many trade associations and has chosen to highlight a select few that are specifically focused on climate and energy issues. This group (formerly the American Wind Energy Association) was created in 2020 to advance all renewable energy technologies in markets across the United States. Google joined in 2020 and was a founding member of this organization. We do not provide funding beyond membership. We maintain regular engagement with top leadership of the key trade associations in which we are members.

---

**Trade association**

Energy Storage Association

**Is your position on climate change consistent with theirs?**

Consistent

**Please explain the trade association's position**

The U.S. Energy Storage Association (ESA) is the national trade association dedicated to energy storage, working toward a more resilient, efficient, sustainable and affordable electricity grid – as is uniquely enabled by energy storage. With approximately 200 members, ESA represents a diverse group of companies, including independent power producers, electric utilities, energy service companies, financiers, insurers, law firms, installers, manufacturers, component suppliers and integrators involved in deploying energy storage systems around the globe. For more information, see <https://energystorage.org/>

**How have you influenced, or are you attempting to influence their position?**

Google is part of many trade associations and has chosen to highlight a select few that are specifically focused on climate and energy issues. Google joined this group in 2019. We are not on the Board of this trade association and do not provide funding beyond membership. We serve on the Leadership Council. However, we maintain regular engagement with top leadership of the key trade associations in which we are members.

---

**Trade association**

Advanced Energy Economy

**Is your position on climate change consistent with theirs?**

Consistent

**Please explain the trade association's position**

Advanced Energy Economy (AEE) is a national association of businesses that are making the energy we use secure, clean, and affordable. Advanced energy encompasses a broad range of products and services that constitute the best available technologies for meeting energy needs today and tomorrow. These include energy efficiency, demand response, energy storage, solar, wind, hydro, nuclear, electric vehicles, biofuels and smart grid. AEE represents more than 100 companies in the \$238 billion U.S. advanced energy industry, which employs 3.6 million U.S. workers. For more information, see <https://www.aee.net/>

**How have you influenced, or are you attempting to influence their position?**

Google is part of many trade associations and has chosen to highlight a select few that are specifically focused on climate and energy issues. Google joined this group in 2019. We are not on the Board of this trade association and do not provide funding beyond membership. However, we maintain regular engagement with top leadership of the key trade associations in which we are members.

---

**Trade association**

Japan Climate Leaders Partnership

**Is your position on climate change consistent with theirs?**

Consistent

**Please explain the trade association's position**

Japan Climate Leaders Partnership (JCLP) is a coalition of Japanese companies who hold the firm belief that economic prosperity and sustainability go hand in hand. For more information, see <https://japan-clp.jp/en>

**How have you influenced, or are you attempting to influence their position?**

Google is part of many trade associations and has chosen to highlight a select few that are specifically focused on climate and energy issues. Google joined this group in 2020. We are not on the Board of this trade association and do not provide funding beyond membership. However, we maintain regular engagement with top leadership of the key trade associations in which we are members.

---

C12.3e

---

**(C12.3e) Provide details of the other engagement activities that you undertake.**

In addition to engagement with policy-makers and trade associations, we also engage with organizations that are performing research and disseminating public work related to climate change and energy.

Google was born in Stanford's Computer Science department, so strong relationships with universities and research institutions are in our DNA. To cultivate these collaborations, we administer a variety of programs that provide resources and support to the academic and external research communities. For more information, see <https://ai.google/research/outreach>.

The Google Earth Outreach and Earth Engine teams have helped organizations accelerate climate research. Google created the Earth Outreach program, which works directly with nonprofits and public benefit groups to help them get the mapping resources needed to create knowledge about the environment and communicate it effectively to decision makers. (See <https://www.google.com/earth/outreach/special-projects/> ) Through Earth Engine, tens of thousands of active users around the world have been able to easily analyze over 25 petabytes of freely available geospatial information, resulting in a deeper understanding of the planet.

As an example, Google's Project Sunroof is a tool that helps users decide whether or not to go solar. The tool estimates potential rooftop solar energy production and makes it easy for users to connect with solar installers and take the next step towards going solar. Project Sunroof contains more than 170 million mapped rooftops across 21,500 cities globally, and we've made this information available on [www.google.com/get/sunroof](http://www.google.com/get/sunroof). In 2018, Project Sunroof data was used by the City of San José, CA for their city-wide solar assessment to achieve a proposed 1GW target.

In 2018, we launched the Environmental Insights Explorer (EIE), an online tool designed to make it easier for cities to access, and act upon, new climate-relevant datasets. EIE uses exclusive data sources and modeling capabilities in a freely available platform to help cities measure emission sources, run analyses, and identify strategies to reduce emissions — creating a foundation for effective action. In 2020, the Environmental Insights Explorer expanded to more than 200 global cities that are using the insights to take action to mitigate carbon emissions.

By the end of 2020, there were over 9,600 Google Scholar results, including papers and other scholarly literature documents which cite or mention "Google Earth Engine".

Google employees were also co-authors on a number of public research papers, including one that quantifies global forest change and recognizes the importance of forest ecosystem services using Google Earth Engine. As of the end of 2020, this paper has received nearly 6,500 citations. (See: <http://www.sciencemag.org/content/342/6160/850> ).

We also support organizations working on climate change issues. For example, we work closely with the World Resources Institute to bring technology and expertise to many of their climate and energy programs, including decarbonization scenarios and energy planning tools. Google is also a global partner of the Ellen MacArthur Foundation, which is working to accelerate the transition to a circular economy. Google is also a technology partner to the Ellen MacArthur Foundation's New Plastics Economy initiative to help support organizations in reaching the goal of ending plastic waste and pollution through packaging redesign and new delivery models.

We've also funded a research report by the Center for Resource Solutions that provides recommendations for strengthening the voluntary renewable energy market in China. (See: <https://resource-solutions.org/document/11131901/>)

**C12.3f**

**(C12.3f) What processes do you have in place to ensure that all of your direct and indirect activities that influence policy are consistent with your overall climate change strategy?**

All activities related to engagement on climate policy are coordinated and managed by designated members of our operations team who handle policy, our public policy team, and members of our communications team. These employees coordinate the drafting and review of all public-facing content related to our overall energy, sustainability and climate change strategy. Material is tracked centrally for reference and use by other employees and to further ensure consistency. These employees ultimately report to our Chief Legal Officer, who oversees our policy and communications organizations. Sustainability teams throughout the organization use this team for review to ensure consistency with our overall climate change strategy. An opt-in organization-wide sustainability e-mail list also exists to update those interested on happenings with our overall climate change strategy and actions taken to support it.

---

**C12.4**

**(C12.4) Have you published information about your organization's response to climate change and GHG emissions performance for this reporting year in places other than in your CDP response? If so, please attach the publication(s).**

**Publication**

In mainstream reports

**Status**

Complete

**Attach the document**

alphabet-2020-10K.pdf

**Page/Section reference**

Ongoing Commitment to Sustainability (Page 8)

**Content elements**

Strategy  
Risks & opportunities  
Other metrics

**Comment**

See Page 8 of Alphabet's FY2020 10-K

---

**Publication**

In voluntary sustainability report

**Status**

Underway – previous year attached

**Attach the document**

google-2020-environmental-report.pdf

**Page/Section reference**

Pages 1 to 80

**Content elements**

Governance  
Strategy  
Risks & opportunities  
Emissions figures  
Emission targets  
Other metrics

**Comment**

See Google's 2020 Environmental Report

---

**Publication**

In voluntary communications

**Status**

Complete

**Attach the document**

carbon-free-by-2030.pdf

**Page/Section reference**

Pages 1 to 25

**Content elements**

Strategy  
Risks & opportunities  
Other metrics

**Comment**

See Google's "Realizing a carbon-free future: Google's Third Decade of Climate Action" white paper

---

**Publication**

In voluntary communications

**Status**

Complete

**Attach the document**

case-study-renewable-energy-auctions.pdf

**Page/Section reference**

Pages 1 to 11

**Content elements**

Strategy  
Risks & opportunities  
Other metrics

**Comment**

See Google's case study on "Accelerating Renewable Energy Purchasing Through Auctions"

---

**Publication**

In voluntary communications

**Status**

Complete

**Attach the document**

Artificial Intelligence and the Circular Economy.pdf

**Page/Section reference**

Pages 1 to 34

**Content elements**

Strategy  
Risks & opportunities  
Other metrics

**Comment**

See Google's case study on "Artificial Intelligence and the Circular Economy: AI as a Tool to Accelerate the Transition"

---

**Publication**

In voluntary communications

**Status**

Complete

**Attach the document**

24x7-carbon-free-energy-data-centers.pdf

**Page/Section reference**

Pages 1 to 27

**Content elements**

Strategy  
Risks & opportunities  
Other metrics

**Comment**

See Google's "Moving toward 24x7 Carbon-Free Energy at Google Data Centers: Progress and Insights" white paper

---

**Publication**

In voluntary communications

**Status**

Complete

**Attach the document**

2018-Ecology-Book.pdf

**Page/Section reference**

Pages 1 to 17

**Content elements**

Strategy  
Risks & opportunities  
Other metrics

**Comment**

See Google's case study on "Seeding Resilience with Ecology"

---

**Publication**

In voluntary communications

**Status**

Complete

**Attach the document**

10-years-carbon-neutrality.pdf

**Page/Section reference**

Pages 1 to 3

**Content elements**

Strategy  
Risks & opportunities  
Other metrics

**Comment**

See Google's "10 Years of Carbon Neutrality" white paper

---

**Publication**

In voluntary communications

**Status**

Please select

**Attach the document**

achieving-100-renewable-energy-purchasing-goal.pdf

**Page/Section reference**

Pages 1 to 13

**Content elements**

Strategy  
Risks & opportunities  
Other metrics

**Comment**

---

**Publication**

In other regulatory filings

**Status**

Complete

**Attach the document**

google-2021-eu-nfrd-report.pdf

**Page/Section reference**

Pages 1 to 15

**Content elements**

Governance

Strategy

Risks & opportunities

Other metrics

**Comment**

See Google's 2021 European Union Non-Financial Reporting Directive (NFRD) Report

---

**Publication**

In mainstream reports

**Status**

Complete

**Attach the document**

2021\_alphabet\_proxy\_statement.pdf

**Page/Section reference**

Letter from the Chair of the Board of Directors (Pages 4), Page 59, and Pages 65-66

**Content elements**

Strategy

Risks & opportunities

Other metrics

**Comment**

See Alphabet's 2021 Proxy Statement

---

**Publication**

In voluntary communications

**Status**

Complete

**Attach the document**

247-carbon-free-energy.pdf

**Page/Section reference**

Pages 1 to 21

**Content elements**

Strategy

Risks & opportunities

Other metrics

**Comment**

See Google's "24/7 by 2030: Realizing a Carbon-free Future" white paper

---

**Publication**

In voluntary sustainability report

**Status**

Underway – previous year attached

**Attach the document**

google-2020-supplier-responsibility-report.pdf

**Page/Section reference**

Pages 1 to 40

**Content elements**

Governance

Strategy

Risks & opportunities

Emissions figures

Emission targets

Other metrics

**Comment**

See Google's 2020 Supplier Responsibility Report

---

**Publication**

---

In voluntary communications

**Status**

Complete

**Attach the document**

circular-google.pdf

**Page/Section reference**

Pages 1 to 15

**Content elements**

Strategy

Risks & opportunities

Other metrics

**Comment**

See Google's "A Circular Google in a Sustainable World" white paper

---

## C15. Signoff

---

### C-FI

---

**(C-FI) Use this field to provide any additional information or context that you feel is relevant to your organization's response. Please note that this field is optional and is not scored.**

For more information on how climate change is integrated into our business strategy, see the resources below, as well as the attachments in section 12.4 'Communication':

#### OVERALL SUSTAINABILITY STRATEGY

Google Sustainability website

<https://sustainability.google>

Google Sustainability blog

<https://blog.google/outreach-initiatives/sustainability>

Google Environmental Report

<https://www.gstatic.com/gumdrop/sustainability/google-2020-environmental-report.pdf>

2020 blog post: Our third decade of climate action: Realizing a carbon-free future

<https://blog.google/outreach-initiatives/sustainability/our-third-decade-climate-action-realizing-carbon-free-future/>

2020 blog post: Alphabet issues sustainability bonds to support environmental and social initiatives

<https://www.blog.google/alphabet/alphabet-issues-sustainability-bonds-support-environmental-and-social-initiatives/>

2019 blog post: Steps towards a more sustainable future

<https://www.blog.google/outreach-initiatives/sustainability/steps-toward-more-sustainable-future/>

2019 blog post: It should be the goal of every business to protect our planet

<https://www.blog.google/outreach-initiatives/sustainability/cop25-every-business-protect-our-planet/>

#### ENERGY EFFICIENCY

Google Data Centers website: Efficiency: How We Do It

<https://www.google.com/about/datacenters/efficiency/>

Spotlight: Machine Learning Finds New Ways for Our Data Centers to Save Energy

<https://sustainability.google/projects/machine-learning/>

2018 blog post: Safety-first AI for autonomous data center cooling and industrial control

<https://www.blog.google/inside-google/infrastructure/safety-first-ai-autonomous-data-center-cooling-and-industrial-control/>

## **CARBON-FREE ENERGY**

2020 blog post: Announcing 'round-the-clock clean energy for cloud

<https://cloud.google.com/blog/topics/inside-google-cloud/announcing-round-the-clock-clean-energy-for-cloud>

2020 blog post: Our data centers now work harder when the sun shines and wind blows

<https://www.blog.google/inside-google/infrastructure/data-centers-work-harder-sun-shines-wind-blows/>

Spotlight: Greening the Grid: How Google Buys Renewable Energy

<https://sustainability.google/projects/ppa/>

Spotlight: Northern Exposure: How Our Nordic Renewable Deals Are Reaping Rewards

<https://sustainability.google/projects/northern-exposure/>

Spotlight: The Internet is 24x7—carbon-free energy should be too

<https://sustainability.google/projects/24x7>

2016 white paper: Achieving Our 100% Renewable Energy Purchasing Goal and Going Beyond

<https://www.gstatic.com/gumdrop/sustainability/achieving-100-renewable-energy-purchasing-goal.pdf>

2018 blog post: Meeting Our Match: Buying 100 Percent Renewable Energy

<https://www.blog.google/outreach-initiatives/environment/meeting-our-match-buying-100-percent-renewable-energy/>

2018 blog post: The Internet is 24x7. Carbon-free energy should be too

<https://www.blog.google/outreach-initiatives/sustainability/internet-24x7-carbon-free-energy-should-be-too/>

2018 white paper: Moving toward 24x7 Carbon-Free Energy at Google Data Centers: Progress and Insights

<https://storage.googleapis.com/gweb-sustainability.appspot.com/pdf/24x7-carbon-free-energy-data-centers.pdf>

2019 case study: Accelerating Renewable Energy Purchasing through Auctions

<https://services.google.com/fh/files/misc/case-study-renewable-energy-auctions.pdf>

## **OUR CARBON FOOTPRINT**

Spotlight: Capturing Value from Waste in Upstate New York

<https://sustainability.google/projects/landfill-NewYork/>

2011 white paper: Google's Carbon Offsets: Collaboration and Due Diligence

<https://www.gstatic.com/gumdrop/sustainability/google-carbon-offsets.pdf>

2017 white paper: 10 Years of Carbon Neutrality

<https://storage.googleapis.com/gweb-sustainability.appspot.com/pdf/10-years-carbon-neutrality.pdf>

## **CLIMATE RESILIENCE**

2018 case study: Seeding Resilience with Ecology

<https://storage.googleapis.com/gweb-sustainability.appspot.com/pdf/2018-Ecology-Book.pdf>

## **HOW WE HELP USERS & CUSTOMERS BECOME MORE EFFICIENT**

Google Cloud Sustainability website

<https://cloud.google.com/sustainability/>

Google Nest Learning Thermostat website

[https://store.google.com/us/product/nest\\_learning\\_thermostat\\_3rd\\_gen](https://store.google.com/us/product/nest_learning_thermostat_3rd_gen)

Google Nest: Learn about Eco Temperatures and how to change settings



<https://support.google.com/googlenest/answer/9245535>

Google Maps Transit Information

<https://blog.google/products/maps/hop-on-boardand-go-almost-anywherewith/>

2011 white paper 'Google's Green Computing: Efficiency at Scale'

[http://static.googleusercontent.com/external\\_content/untrusted\\_dlcp/www.google.com/en/us/green/pdfs/google-green-computing.pdf](http://static.googleusercontent.com/external_content/untrusted_dlcp/www.google.com/en/us/green/pdfs/google-green-computing.pdf)

2012 white paper 'Google Apps: Energy Efficiency in the Cloud'

[http://static.googleusercontent.com/external\\_content/untrusted\\_dlcp/www.google.com/en/us/green/pdf/google-apps.pdf](http://static.googleusercontent.com/external_content/untrusted_dlcp/www.google.com/en/us/green/pdf/google-apps.pdf)

2019 blog post: Finding a place to charge your EV is easy with Google Maps

<https://www.blog.google/products/maps/finding-place-charge-your-ev-easy-google-maps/>

2019 blog post: Grab a seat and be on time with new transit updates on Google Maps

<https://www.blog.google/products/maps/grab-seat-and-be-time-new-transit-updates-google-maps/>

2019 blog post: Now in more cities: Lime bikes and scooters on Google Maps

<https://www.blog.google/products/maps/now-more-cities-lime-bikes-and-scooters-google-maps/>

2019 Google AI blog post: Predicting Bus Delays with Machine Learning

<https://ai.googleblog.com/2019/06/predicting-bus-delays-with-machine.html>

2019 blog post: Travel your first and last mile with Google Maps

<https://blog.google/products/maps/travel-your-first-and-last-mile-google-maps/>

## **PRODUCTS**

Product Environmental Reports

<https://store.google.com/magazine/sustainability>

Google Store hardware recycling website

<https://store.google.com/us/magazine/recycling>

Google's Sustainable Shopping Help website

<https://support.google.com/googleshopping/answer/9487502>

2020 blog post: Our next steps on the journey to sustainable hardware

<https://www.blog.google/outreach-initiatives/sustainability/our-next-steps-journey-sustainable-hardware/>

## **CIRCULARITY**

Spotlight: How to build an event booth out of old barns and bicycle tires

<https://sustainability.google/projects/sustainable-events/>

2019 case study: A Circular Google in a Sustainable World

<https://services.google.com/fh/files/misc/circular-google.pdf>

2019 case study: Artificial Intelligence and the Circular Economy: AI as a Tool to Accelerate the Transition

<https://storage.googleapis.com/gweb-sustainability.appspot.com/pdf/AI-and-CE.pdf>

## **SUPPLY CHAIN**

Responsible Supply Chain website

<https://sustainability.google/responsible-supply-chain/>

Google's Supplier Code of Conduct

<https://about.google/supplier-code-of-conduct/>

Spotlight: Building an energy-efficient, low-carbon supply chain

<https://sustainability.google/projects/supply-chain-energy-emissions/>

Spotlight: Partnering with suppliers to create better recycled plastic

<https://sustainability.google/projects/plastics/>

Spotlight: Supply chain meets blockchain for end-to-end mineral tracking

<https://sustainability.google/projects/traceability/>

Spotlight: From pilot to power: Gathering clean energy momentum in the Congo

<https://sustainability.google/projects/congo-power2/>

## C15.1

**(C15.1) Provide details for the person that has signed off (approved) your CDP climate change response.**

|       | Job title  | Corresponding job category    |
|-------|--|-------------------------------|
| Row 1 | Senior Vice President and Chief Financial Officer, Alphabet Inc. and Google LLC. | Chief Financial Officer (CFO) |

## SC. Supply chain module

### SC0.0

**(SC0.0) If you would like to do so, please provide a separate introduction to this module.**

### SC0.1

**(SC0.1) What is your company's annual revenue for the stated reporting period?**

|       | Annual Revenue |
|-------|----------------|
| Row 1 | 182527000000   |

### SC0.2

**(SC0.2) Do you have an ISIN for your company that you would be willing to share with CDP?**

### SC1.1

**(SC1.1) Allocate your emissions to your customers listed below according to the goods or services you have sold them in this reporting period.**

### SC1.2

**(SC1.2) Where published information has been used in completing SC1.1, please provide a reference(s).**

### SC1.3

**(SC1.3) What are the challenges in allocating emissions to different customers, and what would help you to overcome these challenges?**

| Allocation challenges | Please explain what would help you overcome these challenges |
|-----------------------|--|
|-----------------------|--|

### SC1.4

(SC1.4) Do you plan to develop your capabilities to allocate emissions to your customers in the future?

SC2.1

---

(SC2.1) Please propose any mutually beneficial climate-related projects you could collaborate on with specific CDP Supply Chain members.

SC2.2

---

(SC2.2) Have requests or initiatives by CDP Supply Chain members prompted your organization to take organizational-level emissions reduction initiatives?

SC4.1

---

(SC4.1) Are you providing product level data for your organization's goods or services?

Submit your response

---

In which language are you submitting your response?

English

Please confirm how your response should be handled by CDP

|                             | I am submitting to     | Public or Non-Public Submission | Are you ready to submit the additional Supply Chain questions? |
|-----------------------------|------------------------|---------------------------------|--|
| I am submitting my response | Investors<br>Customers | Public                          | Yes, I will submit the Supply Chain questions now              |

Please confirm below

I have read and accept the applicable Terms