Alphabet

CDP Climate Change Response 2020

Published August 2020

C0. Introduction

C0.1

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

This is our 14th 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 do things like tackling deep computer science problems, such as our investments in artificial intelligence (AI) and quantum computing.

Alphabet is a collection of businesses — the largest of which is Google. 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. We take a long term view and manage the portfolio of Other Bets with the discipline and rigor needed to deliver long-term returns. Each of our businesses are designed to prosper through strong leaders and independence.

We have always been a company committed to building products that have the potential to 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's core products and platforms, such as Android, Chrome, Gmail, Google Drive, Google Maps, Google Play, Search, and YouTube each have over one billion monthly active users. As the majority of Alphabet's big bets continue to reside within Google, an important benefit of the shift to Alphabet has been the tremendous focus that we're able to have on Google's many extraordinary opportunities.

We generate revenues primarily by delivering both performance advertising and brand advertising. We continue to look to the future and are making long-term investments that will grow revenues beyond advertising, including Google Cloud, Google Play, hardware, and YouTube. We are also investing in research efforts in AI and quantum computing to foster innovation across our businesses and create new opportunities.

Google's mission to organize the world's information and make it universally accessible and useful is as relevant 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.

Google was incorporated in California in September 1998 and re-incorporated in the State of Delaware in August 2003. In 2015, we implemented a holding company reorganization, and as a result, Alphabet Inc. (Alphabet) became the successor issuer to Google.

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 2019, we had 19 operational campuses across 21 data center locations in the U.S., Europe, South America, and Asia. Some of our locations have more than one data center campus and others were not yet operational during 2019.

As of December 31, 2019, we had 118,899 full-time employees. Our revenues for the fiscal year ended on December 31, 2019 were more than $161 billion, over 99% of which came from Google segment, which includes ads, Android, Chrome, hardware, Google Cloud, Google Maps, Google Play, Search and YouTube.

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 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 2019	December 31 2019	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
Democratic People's Republic of Korea
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
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	The Audit Committee of Alphabet's Board of Directors regularly reviews and discusses with management Alphabet's major risk exposures, and the steps Alphabet takes to detect, monitor, and actively manage such exposures. This includes climate-related issues on an as-needed basis. Google's Sustainability Officer (GSO) provides a scheduled annual update, which includes climate-related issues, to the Audit Committee. 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 in 2019 was approving a package of 18 new renewable energy deals totaling 1.6 GW.

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 Monitoring and overseeing progress against goals and targets for addressing climate-related issues	<Not Applicable>	Google's Sustainability Officer (GSO) provides a scheduled annual update, which includes climate-related issues, to the Audit Committee of Alphabet's Board of Directors. Climate-related issues may also be added to the agenda for meetings of Alphabet's full Board of Directors on an as-needed basis and may be raised by our CFO 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), ethics and compliance, 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).

The highest level of direct responsibility for climate change rests with the Senior Vice President and Chief Financial Officer 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.

The Audit Committee of Alphabet's Board of Directors oversees and monitors the risks and exposures associated with our operational infrastructure, particularly reliability, business continuity, capacity and security, among other matters. Our CFO meets with Alphabet's Audit 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. For example, Google's Sustainability Officer (GSO) provides an annual update to the Audit Committee on our sustainability and climate change strategy.

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), ethics and compliance, 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.

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. Our GSO has responsibility for climate-related issues because she has extensive expertise in sustainability and climate change. 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 disclosure, and engagement with employees on sustainability issues.

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. For all of the reasons listed above, our GSO is well positioned to assess and manage climate-related issues.

Our GSO also has a dotted line report to Google's Senior Vice President of Technical Infrastructure, who is responsible for data center operations, in addition to many other responsibilities. As data center power consumption is responsible for a significant component of Alphabet's carbon footprint and our energy bills, Google's Senior VP of Technical Infrastructure has a strong interest in measuring and offsetting our carbon footprint, as well as in leading Google's work to purchase renewable energy for our operations.

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.

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 inventivized	Comment
Other, please specify (Data center engineer)	Monetary reward	Efficiency project	
Energy manager	Monetary reward	Energy reduction project Energy reduction target	
Facilities manager	Monetary reward	Efficiency project Efficiency target	
Environment/Sustainability manager	Monetary reward	Emissions reduction project Emissions reduction target Company performance against a climate-related sustainability index	
Procurement manager	Monetary reward	Environmental criteria included in purchases 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 Technical 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 that may increase our cost of doing business, limit our ability to pursue certain business models or offer certain products or services, and 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, if, for example, the elimination of policies that enable corporate end users to purchase clean energy or a rollback in state renewable portfolio standards would make it more difficult for Google to meet its renewable 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 renewable power, which are likely to be more expensive than taking it directly from the grid.

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 renewable energy scenario. If we find that renewable 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 wholesale 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 to date. We signed 18 new energy deals across six different countries, bringing the total capacity of our renewable energy projects under contract to nearly 5.5 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 we would not be able to continue working towards our ambition of sourcing carbon-free energy for our operations on a 24x7 basis.

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: https://ssir.org/articles/entry/connecting_climate_resilience_to_the_bottom_line

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 Technical 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 21 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 long-term aspiration of sourcing carbon-free energy on a 24x7 basis, we look for opportunities to procure wholesale renewable energy via long-term contracts with stable prices, such as power purchase agreements (PPAs). In 2019, Google entered into 18 additional long-term renewable energy agreements which, together with our existing long-term contracts, will provide nearly 5.5 GW of renewable energy that is new to the grid. This makes Google the world's largest 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 renewable energy scenario. Renewable 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, 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 renewable power for our data centers, and generate onsite renewable energy at several of our offices. 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 are carbon neutral through the purchase of high-quality carbon offsets. 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 renewable 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. As an example of a case study from a physical risk perspective, when we launched Google's Ecology Program in 2014, our goal was ecological resilience. We incorporated cutting-edge science and data from the onset, sponsoring the San Francisco Estuary Institute to create the Landscape Resilience Framework for ecological planning in the region. We also 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 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. In collaboration with external consultants and other key stakeholders, our GSO led development of a climate resilience strategy in 2017, including a global assessment of the impacts of sea level rise, precipitation, temperature, and water stress on our major real estate operations (defined as our top 23 sites by headcount) and 15 data center sites and a deep dive on the impacts of climate change on our Bay Area headquarters. This included climate scenario analysis. 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. Since sea level rise, flooding and urban heat island effect 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 Ecology Program focused on designing healthy, biodiverse ecosystems that can endure and evolve with a changing climate.

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 or a rollback in state renewable energy and clean energy standards would make it more difficult for Google to meet its renewable 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 renewable power, which are likely to be more expensive than taking it directly from the grid. For example, Ohio rolled back their renewable energy portfolio standards from 12.5% to 8.5% in 2019, adding 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 substantially 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. 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 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 power for our data centers, and generate onsite renewable energy at several of our sites, 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 are carbon-neutral through the purchase of high-quality carbon offsets, so in effect, we already include a carbon price in our operations. 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). 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. For example, in 2019, 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 1.67. By making our products and services more efficient and matching electricity use with renewable energy, Google is creating an alternative low-carbon Cloud solution for businesses that will be beneficial should regulation that increases the price of carbon come forth. Our risk assessments at individual data centers include using a shadow price for carbon to estimate expected future energy costs.
Technology	Relevant, always included	We monitor and consider the ongoing environmental performance of our various technologies, including both our Cloud-based and consumer hardware technologies. We assess the climate-related risks of our consumer hardware technology products through conducting life cycle assessments for each device, which enable us to assess and respond to opportunities to reduce emissions. As it relates to the manufacturing of our consumer hardware technology, Google employs a Supplier Code of Conduct and evaluates the risk of doing business with individual suppliers, which includes considerations of climate risk and conducting sustainable supply chain audits. The Supplier Code of Conduct stipulates that our suppliers, such as suppliers for our consumer hardware products, require their suppliers to follow the same requirements, which flows our requirements up the supply chain. The Supplier Code of Conduct includes expectations that suppliers increase their use of renewable energy and implement resource efficiency initiatives, helping mitigate risks to our consumer hardware technology products. We have several programs that drive supplier engagement and activities in these risk-mitigating areas. In 2019, our Responsible Supply Chain program was directly engaged with 506 active suppliers supporting hardware manufacturing and related services. As a result, 448 (89%) active suppliers have signed our Supplier Code of Conduct. As of December 31, 2019, Google had 21 data center locations, which host our Cloud-based technology products and services. In 2017, we conducted an assessment of Google's exposure to climate risk. 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. 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. To reduce our exposure to this risk, we've improved facility energy use by installing smart temperature and lighting controls and redesigning how power is distributed to reduce energy loss. We have also employed advanced cooling techniques, and have applied machine learning to drive the energy efficiency of our data centers even further. As a result, 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.
Legal	Not relevant, explanation provided	Alphabet is a collection of businesses — the largest of which is Google. 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. Based on current climate-related litigation, we don't believe that Alphabet's industry—internet services—is one with significant risk.
Market	Relevant, sometimes included	Google's revenue is largely based on advertising. Advertisers advertise to users because they believe the users are in a position to become customers via an economic transaction as a result of the advertisement. Advertisers pay Google for the ability to advertise via our online properties. 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 causes 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, we generated 84% ($135,000,000,000) of total Google segment revenues from advertising in 2019. 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 2019 Best Global Brands report, produced independently by Interbrand, ranks Google as the second 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 2019 Best Global Brands report estimates Google's brand value at approximately $168 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 $168 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.
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, 2019, Google had 21 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/index.html 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 collaboration with external consultants and other key stakeholders, Google's Sustainability Officer led development of a climate resilience strategy in 2017, including a global assessment of the impacts of sea level rise, precipitation, temperature, and water stress on our major real estate operations (defined as our top 23 sites by headcount) and 15 data center sites, as well as a deep dive on the impacts of climate change on our Bay Area headquarters.

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. In 2019, our total energy consumption was 12,749,458 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). 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 power for our data centers, and generate onsite renewable energy at several of our sites, 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 are carbon-neutral through the purchase of high-quality carbon offsets, so in effect, we already include a carbon price in our operations.

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)
12100000

Potential financial impact figure – minimum (currency)
<Not Applicable>

Potential financial impact figure – maximum (currency)
<Not Applicable>

Explanation of financial impact figure
If a carbon price of e.g. $14/metric tonne were established through regulation (price of carbon/tonne at AB32 Auction in May 2014), this could increase our costs by ~$12.1M [66,686 metric tons CO2 (2019 Scope 1 emissions) + 794,267 metric tons CO2 (2019 Scope 2 market-based) x $14 = $12,053,342], assuming these costs were passed through to electricity consumers and we were not further able to reduce our carbon footprint. 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 2019, 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 1.67. 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 wholesale renewable energy for our operations via long-term contracts with stable prices. In 2019, we announced 18 more renewable energy commitments to procure 1.6 additional GW of wind and solar power in Finland, Sweden, Denmark, Belgium, Chile, South Carolina, North Carolina, and Texas. 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
Google's core products and platforms, such as Android, Chrome, Gmail, Google Drive, Google Maps, Google Play, Search, and YouTube each have over one billion monthly active users. 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. Through white papers, case studies, and blog posts, we work to establish transparency and share best practices to help others do the same. The 2019 Best Global Brands report, produced independently by Interbrand, ranks Google as the second most valuable global brand, valued at approximately $168 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)
168000000

Potential financial impact figure – minimum (currency)
<Not Applicable>

Potential financial impact figure – maximum (currency)
<Not Applicable>

Explanation of financial impact figure
This risk driver could have a negative impact on our brands. For example, the 2019 Best Global Brands report, produced independently by Interbrand, estimates Google's brand value at approximately $168 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 $168 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
13000000

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. As a result, we hope our experience will be useful for other non-utility RE buyers, and inspire third-parties to develop new tools and solutions that will democratize auctions as a tool for RE procurement. 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 approximately $13 million per year. The median employee total compensation for the year ended December 31, 2019 was $258,708, as reported on page 49 of Alphabet's Notice of 2020 Annual Meeting of Stockholders and Proxy Statement. Managing these initiatives may hypothetically require the workload of approximately 50 full-time employee equivalents (FTEs), however, this may vary over time and may not be representative of the workload resources currently dedicated to these initiatives. This hypothetical cost figure was calculated as follows: ($258,708 x 50 FTEs) = $12,935,400.

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
<Not Applicable>

Company-specific description
We generated approximately 84% of total Google segment revenues from advertising in 2019. Advertisers advertise to users because they believe the users are in a position to become customers via an economic transaction as a result of the advertisement. Advertisers pay Google for the ability to advertise via our Google properties (including Google Search and other properties and YouTube) and Google Network Members' properties. 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)
1350000000

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, we generated 84% ($135,000,000,000) of total Google segment revenues from advertising in 2019. 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. $1,350,000,000).

Cost of response to risk
1300000

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. 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 our response to this risk is staff time to manage these advocacy activities, industry memberships, grants and research analysis. As a rough estimate, this may be approximately $1.3 million per year. The median employee total compensation for the year ended December 31, 2019 was $258,708, as reported on page 49 of Alphabet's Notice of 2020 Annual Meeting of Stockholders and Proxy Statement. Managing these activities may hypothetically require the workload of approximately 5 full-time employee equivalents (FTEs), however, this may vary over time and may not be representative of the workload resources currently dedicated to these initiatives. This hypothetical cost figure was calculated as follows: ($258,708 x 5 FTEs) = $1,293,540.

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 or state renewable energy and clean energy standards)

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 2019, our total energy consumption was 12,749,458 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. Therefore, Google could face the risk of increased costs to meet its renewable 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 or a rollback in state renewable energy and clean energy standards would make it more difficult for Google to meet its renewable 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 renewable power, which are likely to be more expensive than taking it directly from the grid. We are unable to make precise estimates for this risk, so we have put $0 for potential financial impact.

Cost of response to risk
1300000

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. 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 our response to this risk is staff time for public policy work, which could include traveling to states where renewable portfolio standards are being re-evaluated, and engaging with national trade organizations. As a rough estimate, this may be approximately $1.3 million per year. The median employee total compensation for the year ended December 31, 2019 was $258,708, as reported on page 49 of Alphabet's Notice of 2020 Annual Meeting of Stockholders and Proxy Statement. Managing these activities may hypothetically require the workload of approximately 5 full-time employee equivalents (FTEs), however, this may vary over time and may not be representative of the workload resources currently dedicated to these initiatives. This hypothetical cost figure was calculated as follows: ($258,708 x 5 FTEs) = $1,293,540.

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 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). 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 our 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. Coastal flooding caused 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, 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. As an example of a case study, while we are still developing a method of managing climate risk across our global footprint, we have developed a process for our Bay Area headquarters. For example, Google is engaged in a large-scale master plan effort for our Mountain View and Sunnyvale locations, which are both in California. Sea level rise and flooding have emerged as critical climate risks that could have a significant impact on physical assets, and have been considered as part of the overall development strategy for Google's expanding footprint in the area. 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, in an effort to address this risk, Google's Ecology Program focused on designing healthy, biodiverse ecosystems that can endure and evolve with a changing climate. This includes planting 1.4 acres of native vegetation in our "Green Loop," and adding roughly 5.9 acres of riparian habitat and 1,800 native trees to the Charleston Retention Basin. 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, 2019, Google had 21 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/index.html

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 2019, 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 1.67. 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 G Suite enterprise solutions 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 five 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)
162000000

Potential financial impact figure – minimum (currency)
<Not Applicable>

Potential financial impact figure – maximum (currency)
<Not Applicable>

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 FY2019 revenue of approximately $162 billion, 0.1% would equate to approximately $162 million.

Cost to realize opportunity
13000000

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 one month of Google services creates about the same amount of GHG emissions as driving a car one mile. We were the first major Internet company to achieve a multi-site energy management system certification to ISO 50001, which we maintained from 2013 to 2019. 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 buying electricity directly from wind farms near our data centers. In 2019, we entered into 18 more long-term renewable energy agreements which, together with our existing long-term contracts, provide nearly 5.5 GW of clean, 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. 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 approximately $13 million per year. The median employee total compensation for the year ended December 31, 2019 was $258,708, as reported on page 49 of Alphabet's Notice of 2020 Annual Meeting of Stockholders and Proxy Statement. Managing these initiatives may hypothetically require the workload of approximately 50 full-time employee equivalents (FTEs), however, this may vary over time and may not be representative of the workload resources currently dedicated to these initiatives. This hypothetical cost figure was calculated as follows: ($258,708 x 50 FTEs) = $12,935,400.

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
Google's core products and platforms, such as Android, Chrome, Gmail, Google Drive, Google Maps, Google Play, Search, and YouTube each have over one billion monthly active users. 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 170 cities primarily in North America, Europe, South America, and Asia, and we have 21 data center locations across four continents. We matched 100% of the 2019 electricity consumption of our global operations with renewable energy purchases, 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)
168000000

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 2019 Best Global Brands report, produced independently by Interbrand, estimates Google's brand value at approximately $168 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 $168 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
13000000

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, we expect that there will be more users of Google Maps and Google Transit. In 2019, we added new features and cities to the tool. Google Maps has transit information for nearly 11,000 agencies, running through more than 4.3 million transit stations, in over 100 countries. As a result, Google Maps provides, on average, over 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. 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 approximately $13 million per year. The median employee total compensation for the year ended December 31, 2019 was $258,708, as reported on page 49 of Alphabet's Notice of 2020 Annual Meeting of Stockholders and Proxy Statement. Managing these initiatives may hypothetically require the workload of approximately 50 full-time employee equivalents (FTEs), however, this may vary over time and may not be representative of the workload resources currently dedicated to these initiatives. This hypothetical cost figure was calculated as follows: ($258,708 x 50 FTEs) = $12,935,400.

Comment

Identifier
Opp3

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. Since 2010, Google has made commitments to invest nearly $2.7 billion in large-scale renewable energy projects with an expected total combined capacity of approximately 4.6 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 2019, Google made a commitment to invest approximately $150 million into renewable energy projects in key manufacturing regions, bringing our total committed capital from approximately $2.5 billion to nearly $2.7 billion. Our recent $150 million investment commitment, alongside partners, aims to catalyze roughly $1.5 billion of capital into renewable energy. With these investments, we expect to help generate renewable energy that is equivalent to the amount of electricity used to manufacture our Google consumer hardware products. (See: https://www.blog.google/outreach-initiatives/sustainability/hardware-sustainability-progress/).

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 estimates that the world will spend $26 trillion over the next two decades to build the energy infrastructure necessary to meet global demand. Bloomberg New Energy Finance estimates that $7 trillion will be spent through 2020 for renewable energy. This presents a tremendous business opportunity for the private sector to help pave the path towards a clean energy future while making attractive risk adjusted returns. In pursuing this opportunity, Google has made commitments to invest nearly $2.7 billion in large-scale renewable energy projects with an expected total combined capacity of approximately 4.6 GW (separate from the PPAs we use to purchase renewable energy for our own operations). In 2019, Google made a commitment to invest approximately $150 million into renewable energy projects in key manufacturing regions, bringing our total committed capital from approximately $2.5 billion to nearly $2.7 billion. Our recent $150 million investment commitment, alongside partners, aims to catalyze roughly $1.5 billion of capital into renewable energy. With these investments, we expect to help generate renewable energy that is equivalent to the amount of electricity used to manufacture our Google consumer hardware products. (See: https://www.blog.google/outreach-initiatives/sustainability/hardware-sustainability-progress/). Our returns on investment are confidential, so we have put $0 for potential financial impact.

Cost to realize opportunity
1300000

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. Since 2010, Google has made commitments to invest nearly $2.7 billion in large-scale renewable energy projects with an expected total combined capacity of approximately 4.6 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 2019, Google made a commitment to invest approximately $150 million into renewable energy projects in key manufacturing regions, bringing our total committed capital from approximately $2.5 billion to nearly $2.7 billion. Our recent $150 million investment commitment, alongside partners, aims to catalyze roughly $1.5 billion of capital into renewable energy. As a result, with these investments, we expect to help generate renewable energy that is equivalent to the amount of electricity used to manufacture our Google consumer hardware products. (See: https://www.blog.google/outreach-initiatives/sustainability/hardware-sustainability-progress/). 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 this opportunity is staff time for due diligence and oversight of renewable energy deals. As a rough estimate, this may be approximately $1.3 million per year. The median employee total compensation for the year ended December 31, 2019 was $258,708, as reported on page 49 of Alphabet's Notice of 2020 Annual Meeting of Stockholders and Proxy Statement. Managing these activities may hypothetically require the workload of approximately 5 full-time employee equivalents (FTEs), however, this may vary over time and may not be representative of the workload resources currently dedicated to these initiatives. This hypothetical cost figure was calculated as follows: ($258,708 x 5 FTEs) = $1,293,540.

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. 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. In 2019, Google made a commitment to invest approximately $150 million into renewable energy projects in key manufacturing regions, bringing our total committed capital from approximately $2.5 billion to nearly $2.7 billion. Our recent $150 million investment commitment, alongside partners, aims to catalyze roughly $1.5 billion of capital into renewable energy. With these investments, we expect to help generate renewable energy that is equivalent to the amount of electricity used to manufacture our Google consumer hardware products. (See: https://www.blog.google/outreach-initiatives/sustainability/hardware-sustainability-progress/).

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 estimates the world will spend $26 trillion over the next two decades to build the energy infrastructure necessary to meet global demand. Bloomberg New Energy Finance states that 2015 was the first time that renewable energy (excluding large hydro) made up over half of all the energy capacity additions worldwide and estimates that $7 trillion will be spent through 2020 for renewable energy. 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, Google has made commitments to invest nearly $2.7 billion in large-scale renewable energy projects with an expected total combined capacity of approximately 4.6 GW (separate from the PPAs we use to purchase renewable energy for our own operations). In 2019, Google made a commitment to invest approximately $150 million into renewable energy projects in key manufacturing regions, bringing our total committed capital from approximately $2.5 billion to nearly $2.7 billion. Our recent $150 million investment commitment, alongside partners, aims to catalyze roughly $1.5 billion of capital into renewable energy. With these investments, we expect to help generate renewable energy that is equivalent to the amount of electricity used to manufacture our Google consumer hardware products. We will continue to manage our existing investments. Our ROI is confidential, so we have put $0 for financial impact.

Cost to realize opportunity
1300000

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. Since 2010, Google has made commitments to invest nearly $2.7 billion in large-scale renewable energy projects with an expected total combined capacity of approximately 4.6 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 2019, Google made a commitment to invest approximately $150 million into renewable energy projects in key manufacturing regions, bringing our total committed capital from approximately $2.5 billion to nearly $2.7 billion. Our recent $150 million investment commitment, alongside partners, aims to catalyze roughly $1.5 billion of capital into renewable energy. As a result, with these investments, we expect to help generate renewable energy that is equivalent to the amount of electricity used to manufacture our Google consumer hardware products. (See: https://www.blog.google/outreach-initiatives/sustainability/hardware-sustainability-progress/). 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 this opportunity is staff time for due diligence and oversight of renewable energy deals. As a rough estimate, this may be approximately $1.3 million per year. The median employee total compensation for the year ended December 31, 2019 was $258,708, as reported on page 49 of Alphabet's Notice of 2020 Annual Meeting of Stockholders and Proxy Statement. Managing these activities may hypothetically require the workload of approximately 5 full-time employee equivalents (FTEs), however, this may vary over time and may not be representative of the workload resources currently dedicated to these initiatives. This hypothetical cost figure was calculated as follows: ($258,708 x 5 FTEs) = $1,293,540.

Comment

Identifier
Opp5

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
Our products 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)
168000000

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 2019 Best Global Brands report, produced independently by Interbrand, estimates Google's brand value at approximately $168 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 $168 million via brand loyalty created by wider social benefits.

Cost to realize opportunity
0

Strategy to realize opportunity and explanation of cost calculation
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 to mine this massive warehouse of data about Earth's natural resources to detect changes, map trends and quantify differences on the earth's surface. 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, the Global Surface Water Explorer was launched at the UN World Data Forum in 2018. Developed by

Google in conjunction with the European Commission's Joint Research Centre, it maps the location and temporal distribution of water surfaces at the global scale over the past 3.5 decades and provides statistics on the extent and change of those water surfaces. In 2019, Global Surface Water Explorer was expanded to include a new platform that enables all countries to freely measure and monitor when and where water is changing: UN's Water-Related Ecosystems, or sdg661.app. As a result, the new app, created in partnership with United Nations Environment, provides statistics for every country's annual surface water (like lakes and rivers). It also shows changes from 1984 through 2018 through interactive maps, graphs and full-data downloads (See https://blog.google/products/earth/new-app-map-and-monitor-worlds-freshwater-supply/). In addition to Google's significant longstanding and ongoing investments in sustainability, one of the costs associated with our Earth Engine efforts is staff time managing software development and 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
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, we expect that energy prices will increase and hence, more consumers will use public and alternative transportation rather than private vehicles. We therefore see 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, Google Maps Transit provides maps and schedules for public transit systems in cities worldwide. Currently, Google Maps serves one billion active monthly users with mapping tools. Google Maps has transit information for nearly 11,000 agencies, running through more than 4.3 million transit stations, in over 100 countries. It provides, on average, over 1 billion km worth of transit results every day. For more information about how Google Maps helps users minimize their impact on the environment, see: http://googleblog.blogspot.com/2014/05/hop-on-boardand-go-almost-anywherewith.html.

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)
168000000

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 2019 Best Global Brands report, produced independently by Interbrand, estimates Google's brand value at approximately $168 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 $168 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. We make Google Maps available in 69 different languages and it is compatible with screen readers for the visually impaired. We have made the Transit and Biking Directions on Google Maps feature available on selected mobile devices through Google Maps for mobile, and we have also included public transportation information in Google Earth. As an example of a case study, as demand increases for information about alternative transportation options, we expect that there will be more users of Google Maps and Google Transit. In 2019, we added new features and cities to the tool. Google Maps has transit information for nearly 11,000 agencies, running through more than 4.3 million transit stations, in over 100 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. For more information about how Google Maps helps users minimize their impact on the environment, see: http://googleblog.blogspot.com/2014/05/hop-on-boardand-go-almost-anywherewith.html. In addition to Google's significant longstanding and ongoing investments in sustainability, one of the costs associated with our Google Transit efforts and Google Maps features is 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) Does your organization use climate-related scenario analysis to inform its strategy?

Yes, qualitative and quantitative

C3.1b

(C3.1b) Provide details of your organization's use of climate-related scenario analysis.

Climate-related scenarios and models applied	Details
RCP 4.5 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. The RCPs describe four possible climate futures. 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, the research team 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 developing 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. 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. For example, we're engaged in a large-scale master plan effort for our Mountain View and Sunnyvale locations in California. Sea level rise, flooding and urban heat island have emerged as critical climate risks that could have a significant impact on physical assets and occupants and have been considered as part of the overall development strategy for Google's expanding real estate footprint in the area. To determine the significance of climate-related risks in relation to other risks, we developed a methodology for evaluating risk from a triple bottom line perspective, including environment, financial and social impacts.

C3.1d

(C3.1d) 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	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. Our products and services like Google Cloud Platform and G Suite enable millions of businesses to shift to our highly efficient, renewable energy–based computing infrastructure. Any regulation that imposes a price on carbon or regulates carbon emissions may incentivize customers to switch their technology infrastructure to G Suite enterprise solutions 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. Some of the most substantial business decisions we've made to date that were influenced by climate change include: signing new renewable energy deals, regulatory work, 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 reduce their emissions through the use of our carbon-neutral services. We conducted a study with National Geographic to determine the emissions savings from a partnership in 2019 to migrate their Image Collection from an on-premise system to Google Cloud Platform. By moving their collection to a virtualized environment, National Geographic reduced their energy and emissions by approximately 62%. The potential time horizon for this impact is predicted to be short-term.
Supply chain and/or value chain	Yes	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. 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 this price is passed on to us from a regulated entity, the cost of running our operations will increase. 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: signing new renewable energy deals, regulatory work, 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 renewable power for our data centers, and generating onsite renewable energy at several of our locations. As a result, in 2019, the average annual Power Usage Effectiveness (PUE) for our global fleet of data centers was 1.10, compared with the industry average of 1.67. In 2019, we also announced 18 more renewable energy commitments to procure 1.6 additional GW of wind and solar power in Finland, Sweden, Denmark, Belgium, Chile, South Carolina, North Carolina, and Texas. The potential time horizon for this impact is predicted to be short-term.
Investment in R&D	Yes	Some of the most substantial business decisions we've made to date that were influenced by climate change include: signing new renewable energy deals, regulatory work, 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 seven 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. As an example of a case study, we strive to develop products that 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. As a result, Google has developed Google Earth Engine (EarthEngine.Google.com), a planetary scale platform for environmental data and analysis that brings together the world's satellite imagery and makes it available online. Also, Google created the Earth Outreach program, which gives nonprofits 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, and thus, increased brand value. The potential time horizon for this impact is predicted to be short-term.
Operations	Yes	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 have increased 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: signing new renewable energy deals, regulatory work, 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 long-term aspiration of sourcing carbon-free energy on a truly 24x7 basis by looking for opportunities to procure wholesale renewable energy via long-term contracts with stable prices, such as power purchase agreements (PPAs). As a result, in 2019, we entered into 18 more long-term renewable energy agreements which, together with our existing long-term contracts, provide nearly 5.5 GW of clean, renewable energy that is new to the grid.

C3.1e

(C3.1e) 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 Indirect costs Capital expenditures Capital allocation Assets Liabilities	Liabilities: The availability of our products and services depends on the continuing operation of our information technology and communications systems. 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. Our headquarters are located in Mountain View, California. We also own and lease office and building space in the surrounding areas near our headquarters, which we believe is sufficient to accommodate anticipated future growth. 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. In an effort to address this risk, Google's Urban Ecology Program focused on designing healthy, biodiverse ecosystems that can ensure and evolve with a changing climate. As a result, Google 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/ The potential time horizon for this impact is predicted to be medium-term. Revenues: Any regulation that imposes a price on carbon or regulates carbon emissions may incentivize customers to switch their technology infrastructure to G Suite enterprise solutions and take advantage of Google Cloud, which is highly energy efficient and is carbon neutral. This could create additional demand for Google's existing products and/or services, and therefore increase revenues. If new carbon regulations are implemented, Google is in a position to grow its products and services, and therefore its revenues, as a Google data center is, on average, twice as energy efficient as a typical enterprise data center. The potential time horizon for this impact is predicted to be short-term. Indirect costs: Running our business requires us to use a lot of electricity to power our data centers, offices, and other infrastructure. Google has 21 data center locations. In 2019, our total energy consumption was 12,749,458 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. 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. The potential time horizon for this impact is predicted to be medium-term. Capital expenditures: Google has 21 data center locations. As Google requires a lot of energy to run our operations, we 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). Capital allocation: We continue to assess the potential impacts of carbon taxes and legislation. 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. We are also carbon neutral through the purchase of high-quality carbon offsets, so in effect, we already include a carbon price in our operations. The potential time horizon for this impact is predicted to be short-term. Assets: 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. Since 2010, Google has made commitments to invest nearly $2.7 billion in large-scale renewable energy projects and residential solar rooftop funds with an expected total combined capacity of approximately 4.6 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 2019, Google made a commitment to invest approximately $150 million into renewable energy projects in key manufacturing regions, bringing our total committed capital from approximately $2.5 billion to nearly $2.7 billion. Our recent $150 million investment commitment, alongside partners, aims to catalyze roughly $1.5 billion of capital into renewable energy. As a result, with these investments, we expect to help generate renewable energy that is equivalent to the amount of electricity used to manufacture our Google consumer hardware products. (See: https://www.blog.google/outreach-initiatives/sustainability/hardware-sustainability-progress/). The potential time horizon for this impact is predicted to be medium-term.

C3.1f

(C3.1f) 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. Our products and services like Google Cloud Platform and G Suite enable millions of businesses to shift to our highly efficient, renewable energy–based computing infrastructure.

i. Our strategy around carbon mitigation for operations 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.

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 Technical 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 Operations Program, which requires each participating office 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, regulatory opportunity also influenced our strategy; 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 seven 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 we've maintained carbon neutrality for thirteen consecutive years. 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 three years, in 2017, 2018, and 2019, 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.

Our long-term goals to build a cleaner energy future will result in our products and services, and therefore ultimately our users, reducing their environmental footprint. The most important component of this strategy is our commitment to seek out long-term contracts for the purchase of renewable electricity. To meet that goal, we continue to pursue such contracts, 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 renewable 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 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. In 2019, the most substantial business decisions we made that were influenced by climate change include signing new renewable energy deals, regulatory work, and ongoing data center efficiency efforts, as follows:

- We entered into 18 more long-term renewable energy agreements which, together with our existing long-term contracts, provide nearly 5.5 GW of clean, renewable energy. The 1.6 GW package of agreements represents our biggest commitment ever to purchase renewable energy—and the largest such announcement made by any corporation to date. The package included wind and solar projects in Finland, Sweden, Denmark, Belgium, Chile, South Carolina, North Carolina, and Texas.

- We engaged directly with policymakers to call for policies that promote renewable energy and/or reduce carbon emissions. For example, we worked with the European Commission on a case study about Google's purchases of renewable energy in Europe, which included suggested policy reforms for accelerating corporate buying of renewable energy (See https://blog.google/around-the-globe/google-europe/accelerating-europes-clean-energy-transition/). We also signed a letter sent by the RE-Source Platform Steering Committee European policymakers, urging them to prioritize the removal of barriers to corporate renewable energy purchasing in their evaluation of member states' National Energy and Climate Plans.

- From 2013 to 2019, we maintained an energy management system for our data centers and a corporate, multi-site ISO 50001 certification.

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)
1402953

Covered emissions in base year as % of total base year emissions in selected Scope(s) (or Scope 3 category)
100

Target year
2019

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

Please explain (including target coverage)
Every year, we have a goal of being carbon neutral. As of December 31, 2019, we reached carbon neutrality for 100% of our FY2019 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. 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.

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

Please explain (including target coverage)
Abs2 includes Scope 1 emissions, and is our interim target for Abs3. On July 27, 2015, Google committed to tripling our purchases of renewables (then 1.1GW) by 2025 (see: https://www.whitehouse.gov/the-press-office/2015/07/27/fact-sheet-white-house-launches-american-business-act-climate-pledge). This was expected to result in installed production capacity of 3.4GW of renewable power and an annual GHG emissions reduction of approximately 2.7 million tCO2 by 2025, of which an increase of 1.8 million tCO2 in our annual GHG emissions reduction (from 0.9 million tCO2/year to 2.7 million tCO2/year) will be achieved by 2025. We exceeded this target in 2018, seven years early. From 2010 to 2019, we've signed 52 agreements totaling nearly 5.5 gigawatts of renewable energy. As of the end of 2019, our annual greenhouse gas emissions reductions from our renewable energy projects were 4.3 million metric tons, which puts us 238% of the way towards this goal from an emissions reduction perspective, and 191% of the way towards this goal from a renewable energy perspective. Our calculations assume that the grid emissions factors in the target year remain the same. Our overall energy usage from base year to target year is expected to increase, so this target is expected to result in an equivalent annual reduction of emissions from base year to target year of 124% by 2025, though we have written 100% as that is the maximum value possible for this field. Our % reduction from base year represents annual emissions reductions in our target year due to additional purchases of renewables (1.8 million tCO2), as compared to our annual base year emissions covered by this target (1.5 million tCO2). [(1.8 million tCO2/1.5 million tCO2) x 100 = 124%]. Our market-based Scope 2 emissions represented 92.2% of our combined Scope 1 and market-based Scope 2 emissions in 2019.

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

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 three years (2017-2019) 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 2019, our annual GHG reductions from our renewable energy projects were 4.3 million metric tons. This puts us 191% of the way towards this goal from an emissions reduction perspective. Google is the largest cumulative corporate purchaser of renewable energy in the world. From 2010 to 2019, we've signed 52 agreements totaling nearly 5.5 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 tCO2 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. At the same time, we're pursuing a longer-term ambition: to match every hour of our electricity consumption at every data center location with carbon-free electricity on the same grid.

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 2019, we achieved it for the third 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 corporate purchaser of renewable energy in the world. Since 2010, we've signed 52 agreements totaling nearly 5.5 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. 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 2018, we announced a longer-term ambition to power all of our data centers with carbon-free energy on a 24x7 basis (every hour of every day). We also published a paper tracking our progress toward that goal (see https://storage.googleapis.com/gweb-sustainability.appspot.com/pdf/24x7-carbon-free-energy-data-centers.pdf). 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 (see https://www.whitehouse.gov/the-pressoffice/2015/07/27/fact-sheet-white-house-launches-american-business-act-climate-pledge).

C4.3

(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*	0	0
Implementation commenced*	4	151
Implemented*	499	51407
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)
151

Scope(s)
Scope 1
Scope 2 (market-based)

Voluntary/Mandatory
Voluntary

Annual monetary savings (unit currency – as specified in C0.4)
1625957

Investment required (unit currency – as specified in C0.4)
16500000

Payback period
11-15 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 2019, significant progress was made on 4 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. As of December 31, 2019, we achieved a 56% reduction of Scope 1 and 2 emissions per FTE through various energy efficiency and emissions reductions projects. 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)
44

Scope(s)
Scope 2 (market-based)

Voluntary/Mandatory
Voluntary

Annual monetary savings (unit currency – as specified in C0.4)
17635

Investment required (unit currency – as specified in C0.4)
0

Payback period
1-3 years

Estimated lifetime of the initiative
6-10 years

Comment
Energy efficiency projects in our San Francisco Bay Area offices. In 2019, 11 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

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

Estimated annual CO2e savings (metric tonnes CO2e)
7442

Scope(s)
Scope 1
Scope 2 (market-based)

Voluntary/Mandatory
Voluntary

Annual monetary savings (unit currency – as specified in C0.4)
4018248

Investment required (unit currency – as specified in C0.4)
23500000

Payback period
4-10 years

Estimated lifetime of the initiative
Ongoing

Comment
Implementation of ongoing energy efficiency improvements in our San Francisco Bay Area offices. In 2019, 444 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

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

Estimated annual CO2e savings (metric tonnes CO2e)
200

Scope(s)
Scope 2 (market-based)

Voluntary/Mandatory
Voluntary

Annual monetary savings (unit currency – as specified in C0.4)
61676

Investment required (unit currency – as specified in C0.4)
23196

Payback period
<1 year

Estimated lifetime of the initiative
Ongoing

Comment
Implementation of 17 fine-tuning initiatives to improve energy management at our office in Kirkland, Washington in 2019. 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)
463

Scope(s)
Scope 2 (market-based)

Voluntary/Mandatory
Voluntary

Annual monetary savings (unit currency – as specified in C0.4)
24941

Investment required (unit currency – as specified in C0.4)
14040

Payback period
<1 year

Estimated lifetime of the initiative
Ongoing

Comment
Implementation of 22 fine-tuning initiatives to improve energy management at our office in Krakow, Poland in 2019. 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)
43000

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 2019, our Google shuttle buses in the Bay Area produced savings of more than 43,000 tCO2e emissions. The 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)
258

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 2019. 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
Financial optimization calculations	We conduct payback calculations to decide which emissions reduction activities will best help us meet our carbon neutral goal and deliver the best financial returns to the company.

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
Group of products

Description of product/Group of products
G Suite: G Suite (including G Suite for Education and G Suite for Nonprofits) is a set of cloud-based intelligent apps designed with real-time collaboration and machine intelligence to bring people together and help them work smarter. G Suite includes: Gmail, Drive, Docs, Sheets, Slides, Calendar, Meet, Chat, Keep, Sites and Cloud Search. G Suite for Education is the same set of apps as G Suite, but includes Classroom, and is designed with features that make work easier and bring teachers and students together. G Suite for Nonprofits provides the features and functionality of G Suite Basic, with Shared Drives and Google Classroom included. Nonprofit users also get discounted access to G Suite Business and Enterprise editions. Nonprofits use G Suite to communicate, collaborate, streamline operations, and get work done virtually.

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 G Suite (formerly known as Google Apps) at large. By switching to G Suite, 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 G Suite. The experience of one of our large G Suite clients, the U.S. General Services Administration (GSA), supports these findings. By switching to G Suite 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

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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
<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. 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 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

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Level of aggregation
Group of products

Description of product/Group of products
Google Cloud Platform: Google Cloud Platform 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 Cloud Machine Learning For more information on Google Cloud Platform, 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 Platform, 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 seven 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
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 over 1 billion km worth of transit results every day. Google Maps has transit information for nearly 11,000 agencies, running through more than 4.3 million transit stations, in over 100 countries. In 2018, Google Maps launched a new feature to enable users to search for information about electric vehicle charging stations around the world. For more information, see our blog post on Google Maps and transit: https://googleblog.blogspot.com/2014/05/hop-on-boardand-go-almost-anywherewith.html

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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. By the end of 2019, Project Sunroof contained data for more than 170 million mapped rooftops globally, and we've made this information available on www.google.com/get/sunroof, insights.sustainability.google, and on partner sites around the world. For more information, see: https://www.google.com/get/sunroof

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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. For the past few years, Google Earth Outreach has worked with the Environmental Defense Fund (EDF) to map thousands of methane leaks from natural gas lines under select U.S. city streets using Street View cars equipped with methane analyzers. In 2018, we announced that we were expanding to the new Street View fleet -- starting with 50 cars in 2019. This is the next step in Project Air View's efforts to make air quality information more accessible and useful -- essentially making the invisible visible. We also launched our first projects in Europe -- first, in Copenhagen, and then in London, where we are part of a coalition with EDF and C40.org to map air pollution in London at a hyperlocal level. These hyperlocal 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
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
<Not Applicable>

Asset classes/ product types
<Not Applicable>

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, 2019, Nest thermostats had saved over 47 billion kWh -- that's enough energy to power the city of San Francisco for over eight years. Independent studies showed that Nest saved people an average of 10% to 12% on heating and 15% on cooling. Based on typical energy costs, we've estimated average savings of $131 to $145 a year. That means a Nest thermostat can pay for itself in under two years. Nest thermostats control residential heating and cooling systems, reduce home energy consumption, and help achieve collective savings. They 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. Most people leave their thermostat at one temperature and forget to change it, while the Nest thermostat learns your schedule, programs itself, and can be controlled from your phone. 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 - 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
Company-wide

Description of product/Group of products
Other: Alphabet and Google offer many products and services in addition to those mentioned above, including Search, Chrome, Android, Play, Travel, Translate, Pay, Fiber, Photos, and YouTube. Google's core products and platforms such as Android, Chrome, Gmail, Google Drive, Google Maps, Google Play, Search, and YouTube each have over one billion monthly active users.

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 Google data, we are carbon neutral, and we adhere to the highest certified environmental, health and safety standards. Compared with five years ago, we now deliver around seven times as much computing power with the same amount of electrical power.

Level of aggregation
Product

Description of product/Group of products
Environmental Insights Explorer: In 2018, we launched the Environmental Insights Explorer (EIE), a new online tool created in collaboration with the Global Covenant of Mayors for Climate & Energy (GCoM), which is designed to make it easier for cities to access, and act upon, new climate-relevant datasets. By analyzing Google's comprehensive global mapping data together with standard greenhouse gas (GHG) emission factors, EIE estimates city-scale building and transportation carbon emissions data, as well as renewable energy potential, leading to more globally-consistent baselines from which to build policies, guide solutions, and measure progress.

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. The Environmental Insights Explorer was launched in 2018, and expanded in 2019 to over 120 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 CO2e. 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. For more information, see insights.sustainability.google and blog posts and case studies on Medium: https://medium.com/google-earth/environmental-insights-explorer/home

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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
<Not Applicable>

Asset classes/ product types
<Not Applicable>

Comment
Google Shopping is committed to shaping a sustainable shopping journey. Leveraging different data sources, Google highlights new signals throughout the shopping experience, informing and guiding sustainable customer choices. These efforts include recyclable products, sustainably certified products as well as organic and cruelty free certified products. Google Shopping has efforts focused on reducing packaging use and incorporating a plastic free packaging suite into the merchant's fulfillment process. Google Shopping (Buy on Google orders) is now carbon neutral in the US and France. To achieve this, we offset carbon emissions generated from shipping orders to customers. For every metric ton of carbon dioxide emitted during the shipping process, we fund external projects that reduce the same number of emissions. We've continually offset emissions since October 2019. For more details, please see https://support.google.com/googleshopping/answer/9487502?hl=en These efforts help third-parties avoid Scope 3 emissions.

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 CO2e)
10919

Comment

Scope 2 (location-based)

Base year start
January 1 2009

Base year end
December 31 2009

Base year emissions (metric tons CO2e)
1147991

Comment

Scope 2 (market-based)

Base year start
January 1 2009

Base year end
December 31 2009

Base year emissions (metric tons CO2e)
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)
66686

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
5116949

Scope 2, market-based (if applicable)
794267

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
This year we updated our methodology to estimate GHG emissions from manufacturing Alphabet consumer devices, and included the estimates in the totals reported in "Capital Goods" and "Other (upstream)", along with the description of the methodology included in the sections below. We continued to factor our food program into this category. We conducted the estimate using procurement data from Bay Area cafes and microkitchens as a proxy for our global operations. We used LCA emission factors sourced from publicly available datasets recommended by WRI and we combined them with annual Bay Area procurement volumes. We then extrapolated 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. 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
2158000

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 "Tier 1" suppliers who are manufacturing suppliers with whom we have a direct relationship. GHG emissions were estimated by using facility and company level emissions allocated to Alphabet reported by suppliers or calculated based on GHG intensity and spend data, and scaled up with total spend to represent 100% of the spend. For fabless suppliers, company-level allocated emissions for their Scope 1, 2 and manufacturer's data were used when reported. Data gaps were estimated with CDP'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
44

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
460000

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
94

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
369000

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.

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

Please explain

Employee commuting

Evaluation status
Relevant, calculated

Metric tonnes CO2e
173000

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.

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 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 sell intermediate goods that require further processing.

Use of sold products

Evaluation status
Relevant, calculated

Metric tonnes CO2e
0

Emissions calculation methodology
The GHG emissions from use of sold products were calculated for all of Google's flagship products sold in 2019. 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 CO2e
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 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 downstream leased assets.

Franchises

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 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
8509000

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

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	21921	

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
0.00000532

Metric numerator (Gross global combined Scope 1 and 2 emissions, metric tons CO2e)
860953

Metric denominator
unit total revenue

Metric denominator: Unit total
161857000000

Scope 2 figure used
Market-based

% change from previous year
2.74

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 2019, 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. In addition, we continue to deliver more and better services and products to more users using less energy and fewer emissions, as well as to operate our data centers and offices more efficiently (See: https://www.google.com/about/datacenters/efficiency/). Despite a significant increase in our total procurement of renewable energy in 2019 to match 100% of the electricity consumption of our operations, we have data centers in a few locations (i.e. Singapore) on grids where we are not able to source renewable electricity. Our operations at some of these sites grew in 2017, which resulted in a slight increase in our total market-based Scope 2 emissions the following year, in 2018. However, due to an increase in unit total revenue in 2019, a decrease in the amount of combined Scope 1 and 2 emissions per unit of total revenue has been achieved.

Intensity figure
7.9565

Metric numerator (Gross global combined Scope 1 and 2 emissions, metric tons CO2e)
860953

Metric denominator
full time equivalent (FTE) employee

Metric denominator: Unit total
108208

Scope 2 figure used

Market-based

% change from previous year
5.28

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 2019, 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. In addition, we continue to deliver more and better services and products to more users using less energy and fewer emissions, as well as to operate our data centers and offices more efficiently (See: https://www.google.com/about/datacenters/efficiency/). Despite a significant increase in our total procurement of renewable energy in 2019 to match 100% of the electricity consumption of our operations, we have data centers in a few locations (i.e. Singapore) on grids where we are not able to source renewable electricity. Our operations at some of these sites grew in 2017, which resulted in a slight increase in our total market-based Scope 2 emissions in 2018. However, due to an increase in the number of employees in 2019, 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 2019 Scope 1 and market-based Scope 2 emissions divided by our average 2019 headcount.

Intensity figure
0.0675

Metric numerator (Gross global combined Scope 1 and 2 emissions, metric tons CO2e)
860953

Metric denominator
Other, please specify (megawatt hour (MWh) consumed)

Metric denominator: Unit total
12749458

Scope 2 figure used
Market-based

% change from previous year
4.52

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 2019, 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. In addition, we continue to deliver more and better services and products to more users using less energy and fewer emissions, as well as to operate our data centers and offices more efficiently (See: https://www.google.com/about/datacenters/efficiency/). In FY2018, this MWh intensity figure was calculated by taking our 2018 market-based Scope 2 emissions of our data centers divided by the total electricity consumption at our data centers in 2018. For confidentiality reasons, we did not disclose the numerator and denominator in 2018. For FY2019, we have updated our disclosure to include all of our Scope 1 and market-based Scope 2 emissions, and total energy consumption. In order to assess year over year change for this metric, we calculated the 2018 intensity figure using the updated methodology. The 2018 Scope 1 and market-based Scope 2 emissions total divided by total energy consumption in 2018 is 0.0707.

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	66686	IPCC Fourth Assessment Report (AR4 - 100 year) *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.*

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	48840
Other, please specify (Rest of world)	17846

C7.3

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

Please select

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	3771260	10254	8538097	8495178
Other, please specify (Rest of world)	1345689	784013	3844923	2263508

C7.6

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

Please select

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	662233	Decreased	89	The impact of emission reduction due to the increase in renewable energy consumption in 2019 is an 88.6% reduction compared to the emissions we reported last year. In 2019, our additional renewable power purchases (in excess of our 2018 renewable power purchases) resulted in an additional reduction of 662,233 tCO2e beyond our 2018 emissions reduction from renewable energy consumption. In 2018, our total Scope 1 and market-based Scope 2 emissions were 747,757 tCO2e. Therefore we arrived at this percentage decrease as follows: (662,233 / 747,757) x 100 = 89%.
Other emissions reduction activities	51558	Decreased	7	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 2019, our energy efficiency efforts resulted in a reduction of 51,558 tCO2e beyond our 2018 emissions reduction activities. In 2018, our total Scope 1 and market-based Scope 2 emissions were 747,757 tCO2e. Therefore we arrived at this percentage decrease as follows: (51,558 / 747,757) x 100 = 7%. 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. Note: The change in emissions from the change in renewable energy consumption was previously included within the "Other emissions reduction activities" category. For FY2019, the change in emissions from the change in renewable energy consumption is reported in its own category.
Divestment		<Not Applicable>		
Acquisitions		<Not Applicable>		
Mergers		<Not Applicable>		
Change in output	113195	Increased	15	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 2018 to 2019 reported data, growth of our business created a 15% increase in our emissions compared to the emissions we reported last year. This change in output was calculated by taking our 2019 Scope 1 and market-based Scope 2 emissions minus the 2018 Scope 1 and market-based Scope 2 emissions, divided by the 2018 Scope 1 and market-based Scope 2 emissions, then multiplied by 100. Therefore we arrived at this percentage increase as follows: (113,195 / 747,757) x 100 = 15%. This percent change would also be a 15% increase if it were calculated using our location-based Scope 2 emissions. Despite a significant increase in our total procurement of renewable energy in 2019 to match 100% of the electricity consumption of our operations, we have data centers in a few locations (i.e. Singapore) on grids where we are not able to source renewable electricity. 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)	79944	286493	366437
Consumption of purchased or acquired electricity	<Not Applicable>	10755292	1470930	12226222
Consumption of purchased or acquired heat	<Not Applicable>	0	150527	150527
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>	6272	<Not Applicable>	6272
Total energy consumption	<Not Applicable>	10841507	1907951	12749458

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	No
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
79945

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 2018

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
58129

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 2018

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
22270

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 2018

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
56164

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 2018

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
149930

MWh fuel consumed for self-generation of electricity
0

MWh fuel consumed for self-generation of heat
149930

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	10975	10975	6271	6271
Heat				
Steam				
Cooling				

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
Other, please specify (Power Purchase Agreement (PPA) with energy attribute certificates)

Low-carbon technology type
Other, please specify (Wind, Solar)

Country/region of consumption of low-carbon electricity, heat, steam or cooling
Other, please specify (Europe, North America, South America)

MWh consumed accounted for at a zero emission factor
10752415

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 2019, we matched 100% of the electricity consumption of our operations with renewable energy purchases for the third consecutive year. The RE purchases come both from PPAs and from the residual renewables already present in the grids we consume electricity from.

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
9

Direction of change
Decreased

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 0.11 in 2018 and 0.10 in 2019. That’s a 9% decrease, indicating increased energy efficiency year-over-year. 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 2019, the average annual PUE for our global fleet of data centers was 1.10, compared with the industry average of 1.67—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
Google FY2019 GHG Inventory Assurance Letter.pdf

Page/ section reference
Pages 1 to 2

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
Google FY2019 GHG Inventory Assurance Letter.pdf

Page/ section reference
Pages 1 to 2

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
Google FY2019 GHG Inventory Assurance Letter.pdf

Page/ section reference
Pages 1 to 2

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
Google FY2019 GHG Inventory Assurance Letter.pdf

Page/section reference
Pages 1 to 2

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
Google FY2019 GHG Inventory Assurance Letter.pdf

Page/section reference
Pages 1 to 2

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 8 of our flagship products released in 2019 (Google Nest Hub Max, Google Nest Mini (2nd gen), Google Nest Wifi router, Google Nest Wifi point, Pixel 4, Pixel 4 XL, Pixelbook Go, Stadia Controller). 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 https://sustainability.google/reports/. 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.
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 credits (RECs) or the Guarantees of Origin (GOOs). The assurance process ensures we are applying the RECs and GOOs to Scope 2 emissions in accordance to the GHG Protocol Scope 2 Guidance.
C8. Energy	Energy consumption	Attestation standards established by AICPA (AT105)	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 AICPA (AT105)	Total electricity consumption 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
6.48

% of Scope 2 emissions covered by the ETS
0

Period start date
January 1 2019

Period end date
December 31 2019

Allowances allocated
4322

Allowances purchased
4322

Verified Scope 1 emissions in metric tons CO2e
4322

Verified Scope 2 emissions in metric tons CO2e
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.

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. 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)
155552

Number of credits (metric tonnes CO2e): Risk adjusted volume
155552

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 power for our data centers, and generate onsite renewable energy at several of our offices, 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 are carbon neutral through the purchase of high-quality carbon offsets, so in effect, we already include a carbon price in our operations. If a carbon price of e.g. $14/metric tonne were established through regulation (price of carbon/tonne at AB32 Auction in May 2014), this could increase our costs by ~$12.1 million [= (2019 Scope 1 + market-based Scope 2) x $14], assuming these costs were passed through to electricity consumers and we were not further able to reduce our carbon footprint. 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
89

% total procurement spend (direct and indirect)
83

% of supplier-related Scope 3 emissions as reported in C6.5
81

Rationale for the coverage of your engagement
In 2019, our Responsible Supply Chain program was directly engaged with 506 active suppliers supporting hardware manufacturing and related services. Of those, 448 (89%) 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 complete the remaining signatures as we select and onboard new suppliers. In 2019, our active hardware suppliers who signed our SCOC covered 83% of our total spend and 81% of manufacturing emissions from our direct hardware suppliers. 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 based on Tier 1 supplier data and excludes full upstream emissions for which we do not have direct supplier relationships. In 2019, we used the CDP Supply Chain platform and custom surveys to request climate and water data from 177 suppliers and provided individualized feedback on their performance for key KPIs (e.g. emission reduction targets). We've integrated sustainability criteria into our supplier sourcing and performance management processes, which include assessments about a supplier's practices to report, manage and reduce their emissions. 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 2019, our Energy Efficiency and Renewable Energy program continued to engage our suppliers to analyze their energy performance and energy management practices in their manufacturing locations, implement energy conservation measures to maximize energy savings and payback, and develop a comprehensive energy efficiency and renewable energy plan. We also collaborated with suppliers and other stakeholders in our value chain on innovative projects for circular economy pathways. Together with project partners, we 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
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 2019, climate change reporting by our suppliers improved compared to 2018 across all metrics, despite inviting 45% more suppliers. We achieved a response rate of 99% to our climate change survey requests, 95% of our suppliers reported at least one source of GHG emissions (Scope 1 and/or Scope 2 emissions) and 71% 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, to make our carbon footprint data available to our customers. 27 customers requested this data from Alphabet for FY2019. 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 2019, we matched 100% of the electricity consumption of our operations with renewable energy purchases for the third consecutive year. Reaching this milestone was important to us, but it also mattered to many of our customers. We produce and promote content to our Cloud customers about our sustainability and climate change strategy and performance. For example, we launched a microsite to help businesses understand the environmental impact of their operations and how switching to Google Cloud can help reduce it (See https://cloud.google.com/sustainability/). We continue to publish content on the importance of taking sustainability into account with regards to infrastructure and application development (see https://www.blog.google/products/google-cloud/why-building-environmentally-responsible-cloud-matters/, which was promoted on Twitter by the Google Cloud Platform account), and hosted a Cloud OnAir webinar about why building on an environmentally responsible Cloud matters. We included information on our carbon footprint in the Google Cloud newsletter, and provided a subset of our customers with a module for their carbon emissions in their Monthly Operations Report, notifying them of their carbon neutrality. We also include information on our climate change strategy and performance at events such as Google Cloud Next, our annual event for current and prospective Google Cloud customers. To celebrate Earth Month 2019, we highlighted a few sustainability sessions from Google Cloud Next '19 and shared some of the positive environmental impact our customers are driving with Google Cloud.(See https://cloud.google.com/blog/topics/google-cloud-next/our-heads-in-the-cloud-but-were-keeping-the-earth-in-mind) 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.

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. 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/). We've also helped customers reduce their emissions through the use of our carbon-neutral services. We conducted a study with National Geographic to determine the emissions savings from a partnership in 2019 to migrate their Image Collection from an on-premise system to Google Cloud Platform. As a result, by moving their collection to a virtualized environment, National Geographic reduced their energy and emissions by approximately 62%. (See the presentation from Google Cloud Next '19: https://www.youtube.com/watch?v=gsAIg8DVlQY&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 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, since 2011, Geo has partnered with the Environmental Defense Fund (EDF). We started by measuring and mapping methane leaks under city streets and 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 make over 500 million 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. (See https://www.google.com/earth/outreach/special-projects/air-quality/)

In 2018, with the World Resources Institute, the Global Energy Observatory, KTH Royal Institute of Technology in Stockholm, and the University of Groningen, we released a global database of power plants. This database standardizes power sector information and makes it easily accessible to everyone, helping to bring transparency and accountability to the global power sector to accelerate the shift to a clean energy future. (See https://www.blog.google/products/earth/new-public-energy-tool-reduce-emissions/)

In 2019, Google continued our partnership with the Global Covenant of Mayors (GCoM) and Bloomberg Philanthropies to empower cities with the Environmental Insights Explorer (insights.sustainability.google) tool. The partnership entails working collaboratively with GCoM's network partners and committed cities to accelerate climate action planning. (See https://medium.com/google-earth/environmental-insights-explorer/home)

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 G Suite (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 listed in our response to Question 12.3c, such as RE100, RE-Source, and the Renewable Energy Buyers Alliance, as well as many others.

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 2019, this included: European Union renewables policy: - In 2019, the European Commission (EC) completed a review of each member state's National Energy and Climate Plans, which were required under the new "Clean Energy Package" legislation passed at the end of 2018. This legislation included a requirement that all member states identify and remove regulatory and administrative barriers to corporate power purchase agreements (PPAs) in their country. To support this effort, we worked with the EC on a case study about Google's renewable energy purchasing in Europe, including policy recommendations to encourage more corporate renewable energy purchasing. -We signed 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. 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. Google is a founding Strategic Partner of the Re-Source Platform, which we helped launch in 2018. -Google also sponsored the third annual RE-Source conference in Amsterdam, which brought together over 800 government officials and business leaders dedicated to accelerating corporate purchasing of renewable energy in Europe. -We supported trade groups of which we are a member, namely Wind Europe and Solar Power Europe, in their efforts to promote the growth of wind and solar power in Europe. Asia-Pacific region: -To advance solutions for corporate purchasing of renewable energy in China, Google funded a research paper by the Center for Resource Solutions that assesses the existing mechanisms for renewable energy procurement and provides recommendations for policy and market tools to strengthen the market and boost voluntary procurement of renewable energy.	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 Wind Energy Association (AWEA), 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 2019, a Google representative was elected and served as Board Chair of the organization. U.S. state climate and energy policy: - In Georgia, Google worked with the solar energy industry and Georgia Power Company to bring 2GW of new solar energy to the state. This included a significant expansion of the Corporate Solar Program that Google helped establish in 2018. International climate policy: - In December 2019, our CEO Sundar Pichai joined the United for the Paris Agreement letter with over 70 other global CEOs and labor leaders urging the United States to remain in the Paris Agreement. (See https://www.unitedforparisagreement.com/) - We participated actively in COP-25 in Madrid to support a robust outcome from the conference. 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.

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

ACORE, a 501(c)(3) non-profit membership organization, is dedicated to building a more secure and prosperous America with clean, renewable energy. ACORE provides a common educational platform for a wide range of interests in the renewable energy community, focusing on technology, finance and policy. It convenes thought leadership forums and creates energy industry partnerships to communicate the economic, security and environmental benefits of renewable energy. For more information about ACORE, see http://www.acore.org/

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

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/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 represent large customers' renewable energy needs and help them streamline solutions for buying cost-effective renewable energy. With facilitation by WWF and WRI, a group of large energy buyers developed the Buyers' 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 about the Buyer's Principles, see http://buyersprinciples.org/

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

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

Convened by The Climate Group in partnership with CDP, RE100 is a collaborative, global initiative of influential businesses committed to 100% renewable electricity, working to massively increase demand for—and delivery of—renewable energy. For more information about RE100, see http://there100.org/

How have you influenced, or are you attempting to influence their position?
Google joined RE100 in December 2015 (see: http://www.theclimategroup.org/what-we-do/news-and-blogs/google-joins-re100-with-target-to-triple-renewable-energy-by-2025/). 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
NCSEA drives public policy & market development to create clean energy jobs, business opportunities, and affordable energy to benefit North Carolina. For more information about NCSEA, see http://www.energync.org/

How have you influenced, or are you attempting to influence their position?
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
South Carolina Clean Energy Business Alliance (SCCEBA)

Is your position on climate change consistent with theirs?
Consistent

Please explain the trade association's position
SCCEBA promotes the success of the clean energy industry in South Carolina, representing the needs and interests of this growing industry through policy development, educational outreach to decision makers and strategic economic development. SCEEBA was instrumental in getting enactment of S.1189 in 2014 (a third party solar bill). For more information about SCCEBA, see http://www.scceba.org/

How have you influenced, or are you attempting to influence their position?
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
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 and solar energy resources as clean, reliable, affordable, and infinite sources of power. The Alliance is the advanced power industry's voice within the fourteen states of the Electric Reliability Council of Texas (ERCOT) and Southwest Power Pool (SPP) systems: Arkansas, Iowa, Kansas, Louisiana, Minnesota, Missouri, Montana, Nebraska, New Mexico, North Dakota, Oklahoma, South Dakota, Texas and Wyoming. For more information about the Advanced Power Alliance, see https://poweralliance.org/

How have you influenced, or are you attempting to influence their position?
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 (AE Buyers Group) is a coalition of leading advanced energy purchasers who have come together to engage on the energy policy issues that will help them achieve their ambitious clean energy targets. For more information, see https://www.advancedenergybuyersgroup.org/

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

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 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
Solar Power Europe

Is your position on climate change consistent with theirs?
Consistent

Please explain the trade association's position
SolarPower Europe is Europe's solar energy trade association. They represent over 200 upstream and downstream across the solar energy industry, as well as buyers of solar electricity like Google. For more information, see http://www.solarpowereurope.org/

How have you influenced, or are you attempting to influence their position?
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 a European alliance of stakeholders representing clean energy buyers and suppliers working to expand corporate renewable energy sourcing in Europe. This platform pools resources and coordinates activities to promote a better framework for corporate renewable energy sourcing at EU and national level. For more information, see http://resource-platform.eu/

How have you influenced, or are you attempting to influence their position?
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
The Renewable Energy Buyers Alliance is a newly formed national trade organization dedicated to unlocking the marketplace for all non-residential energy buyers to create a resilient zero-carbon energy system where every organization has a viable, expedient, and cost-effective pathway to renewable energy. It includes over 300 renewable energy buyers, developers, and service providers dedicated to scaling up corporate purchasing of clean energy. For more information, see https://rebuyers.org/

How have you influenced, or are you attempting to influence their position?
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 2019, a Google representative served as the Board Chair of this organization.

Trade association
American Wind Energy Association (AWEA)

Is your position on climate change consistent with theirs?
Consistent

Please explain the trade association's position
The American Wind Energy Association (AWEA) is the national trade association for the U.S. wind industry. With thousands of wind industry members and wind policy advocates, AWEA promotes wind energy as a clean source of electricity for American consumers. For more information, see https://www.awea.org/

How have you influenced, or are you attempting to influence their position?
Google joined this group in 2019. We are on the Board of this trade association, however 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 190 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 joined this group in 2019. We are not on the Board of this trade association and do not provide funding beyond membership. We also 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
North Carolina Clean Energy Business Alliance (NCCEBA)

Is your position on climate change consistent with theirs?
Consistent

Please explain the trade association's position
The North Carolina Clean Energy Business Alliance was created to promote the common business interests of clean energy businesses in North Carolina. They represent all types of businesses in the clean energy sector including developers, manufacturing, engineering, construction, professional and financial services, and non-energy businesses wishing to purchase clean energy. For more information, see https://www.ncceba.com/

How have you influenced, or are you attempting to influence their position?
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
Data Center Coalition

Is your position on climate change consistent with theirs?
Consistent

Please explain the trade association's position
The Data Center Coalition (DCC) is the trade association for the data center industry. As the voice of the industry, DCC represents and advances the interests of the data center community and advocates for a strong business climate, policies and investments that support the growth and success of this important business sector. The DCC is headquartered in Northern Virginia, the largest data center market globally. For more information, see https://www.datacentercoalition.org/

How have you influenced, or are you attempting to influence their position?
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
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 business leaders who are making the global energy system more 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. Among these are energy efficiency, demand response, energy storage, natural gas electric generation, solar, wind, hydro, nuclear, electric vehicles, biofuels and smart grid. It's all the innovations that make the energy we use more secure, clean, and affordable. For more information, see https://www.aee.net/

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

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/)

As an example, Google's Project Sunroof is a product that helps users decide whether or not to go solar. The product 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. 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. (See: https://www.google.com/get/sunroof)

In 2018, Google launched the Environmental Insights Explorer (EIE), a new online tool we created in collaboration with the Global Covenant of Mayors for Climate & Energy (GCoM), which is designed to make it easier for cities to access, and act upon, new climate-relevant datasets. By using exclusive data sources and modeling capabilities in a freely available platform, EIE helps cities measure sources of emissions and identify and inform strategies to reduce emissions. By the end of 2019, over 120 cities were using or planned on used EIE in their city-wide climate efforts. (See: https://medium.com/google-earth/environmental-insights-explorer/home)

By the end of 2019, there were over 4,700 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 2019, this paper has received over 4,500 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. We 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.us12.list-manage.com/track/click?u=1fac9b9a5c4dfadc96bd1790c&id=6178df9b30&e=6793367530)

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 G Suite (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 listed in our response to Question 12.3c, such as RE100, RE-Source, and the Renewable Energy Buyers Alliance, as well as many others.

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's FY2019 10-K.pdf

Page/Section reference
Ongoing Commitment to Sustainability (Page 8)

Content elements
Strategy
Risks & opportunities
Other metrics

Comment
See Page 8 of Alphabet's FY2019 10-K

Publication
In voluntary sustainability report

Status
Underway – previous year attached

Attach the document
Google's FY2018 Environmental Report.pdf

Page/Section reference
Pages 2 to 61

Content elements
Governance
Strategy
Risks & opportunities
Emissions figures
Emission targets
Other metrics

Comment
See Google's FY2018 Environmental Report

Publication
In voluntary sustainability report

Status
Underway – previous year attached

Attach the document
Google's FY2018 Responsible Supply Chain Report.pdf

Page/Section reference
Pages 2 to 37

Content elements
Governance
Strategy
Risks & opportunities
Emissions figures
Emission targets
Other metrics

Comment
See Google's FY2018 Responsible Supply Chain Report

Publication
In voluntary communications

Status
Complete

Attach the document

Page/Section reference
Google's Sustainability Website

Content elements
Governance
Strategy

Risks & opportunities
Emissions figures
Emission targets
Other metrics

Comment
For more information, please visit https://sustainability.google

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Publication
In voluntary communications

Status
Complete

Attach the document
Google's 2019 Case Study Accelerating Renewable Energy Purchasing through 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
Google's 2019 Case Study A Circular Google in a Sustainable World.pdf

Page/Section reference
Pages 1 to 15

Content elements
Strategy
Risks & opportunities
Other metrics

Comment
See Google's case study on "A Circular Google in a Sustainable World"

Publication
In voluntary communications

Status
Complete

Attach the document
Google's 2019 Case Study 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
Google's 2018 Case Study Moving toward 24x7 Carbon-free Energy at Google Data Centers.pdf

Page/Section reference
Pages 1 to 27

Content elements
Strategy
Risks & opportunities
Other metrics

Comment
See Google's case study on "Moving toward 24x7 Carbon-Free Energy at Google Data Centers: Progress and Insights"

Publication
In voluntary communications

Status
Complete

Attach the document
Google's 2018 Case Study Seeding Resilience with Ecology.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

Page/Section reference
Website

Content elements
Governance
Strategy
Risks & opportunities
Emissions figures
Emission targets
Other metrics

Comment
For more information, please see Google's official blog, The Keyword, for updates on sustainability topics: https://www.blog.google/outreach-initiatives/sustainability/

Publication
In voluntary communications

Status
Complete

Attach the document
Google's 2017 Case Study 10 Years of Carbon Neutrality.pdf

Page/Section reference
Pages 1 to 3

Content elements
Strategy
Risks & opportunities
Other metrics

Comment
See Google's case study on "10 Years of Carbon Neutrality"

Publication
In voluntary communications

Status
Complete

Attach the document
Google's 2016 White Paper Achieving Our 100% Renewable Energy Purchasing Goal and Going Beyond.pdf

Page/Section reference
Pages 1 to 13

Content elements
Strategy
Risks & opportunities
Other metrics

Comment
See Google's Renewable Energy White Paper

Publication
In other regulatory filings

Status
Complete

Attach the document
Google's FY2019 EU NFRD Report.pdf

Page/Section reference
Pages 1 to 12

Content elements
Governance
Strategy
Risks & opportunities
Other metrics

Comment
See Google's FY2019 European Union Non-Financial Reporting Directive (NFRD) Report

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 Environmental Report

https://sustainability.google/reports/environmental-report-2019

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/

RENEWABLE ENERGY

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://static.googleusercontent.com/media/www.google.com/en//green/pdf/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://static.googleusercontent.com/media/www.google.com/en//green/pdfs/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?hl=en-US

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

https://support.google.com/googlenest/answer/9245535?hl=en

Google Maps Transit Information

http://googleblog.blogspot.com/2014/05/hop-on-boardand-go-almost-anywherewith.html

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

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

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?hl=en&ref_topic=9112782

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	161857000000

SC0.2

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

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?
Please select

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?
Please select

SC3.1

(SC3.1) Do you want to enroll in the 2020-2021 CDP Action Exchange initiative?
Please select

SC3.2

(SC3.2) Is your company a participating supplier in CDP's 2019-2020 Action Exchange initiative?

Please select

SC4.1

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

Please select

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 Customers	Public	Yes, submit Supply Chain Questions now

Please confirm below

I have read and accept the applicable Terms