

Alphabet

CDP Climate Change Response 2022

Published August 2022

C0. Introduction

C0.1

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

This is our 16th consecutive year responding to the CDP Climate Change questionnaire. We began calculating our annual carbon footprint in 2006. Every year since 2009, we've publicly reported the results to CDP.

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

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

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

— —

Google Services

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

Google Services generates revenues primarily by delivering both performance advertising and brand advertising that appears on Google Search & other properties, YouTube and Google Network partners' properties.

Google Cloud

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

Google Cloud Platform generates revenues from infrastructure, platform and other services. Google Workspace generates revenues from cloud-based collaboration tools for enterprises, such as Gmail, Docs, Drive, Calendar and Meet.

— —

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 R&D sites around the world, primarily in North America, Europe, South America, and Asia. We own and operate data centers in the U.S., Europe, South America, and Asia.

As of December 31, 2021, Alphabet had 156,500 employees. Our revenues for the fiscal year ended on December 31, 2021 were \$257.6 billion, over 99% of which came from the Google Services and the Google Cloud segments.

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, goals, 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. They are based on current expectations and assumptions that are subject to risks and uncertainties, which could cause our actual results to 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 filed 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 2021	December 31 2021	No	<Not Applicable>

C0.3

(C0.3) Select the countries/areas in which you operate.

Argentina
Australia
Austria
Belgium
Brazil
Canada
Chile
China
Colombia
Croatia
Czechia
Denmark
Finland
France
Germany
Ghana
Greece
Hong Kong SAR, China
Hungary
India
Indonesia
Ireland
Israel
Italy
Japan
Kenya
Lithuania
Malaysia
Mexico
Netherlands
New Zealand
Nigeria
Norway
Peru
Philippines
Poland
Portugal
Republic of Korea
Romania
Russian Federation
Singapore
Slovakia
South Africa
Spain
Sweden
Switzerland
Taiwan, 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

C0.8

(C0.8) Does your organization have an ISIN code or another unique identifier (e.g., Ticker, CUSIP, etc.)?

Indicate whether you are able to provide a unique identifier for your organization	Provide your unique identifier
Yes, a Ticker symbol	GOOGL
Yes, a Ticker symbol	GOOG

C1. Governance

C1.1

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

Yes

C1.1a

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

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

C1.1b

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

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

C1.1d

(C1.1d) Does your organization have at least one board member with competence on climate-related issues?

	Board member(s) have competence on climate-related issues	Criteria used to assess competence of board member(s) on climate-related issues	Primary reason for no board-level competence on climate-related issues	Explain why your organization does not have at least one board member with competence on climate-related issues and any plans to address board-level competence in the future
Row 1	Yes	Our Board is composed of highly experienced and diverse directors with extensive backgrounds as entrepreneurs, technologists, operational and financial experts, academics, scientists, investors, advisors, nonprofit board members, and government leaders. Our directors have experience serving as board members and/or advisors of various companies, organizations, and foundations, including The Aspen Institute, Climate Imperative Foundation, and the President's Council of Advisors on Science and Technology. One of our directors has also authored a recent book about an action plan for solving the climate crisis and has funded a school of sustainability at a major university. For additional biographical information of our directors and information regarding the director selection process and qualifications, see the sections titled "Directors and Executive Officers" on pages 21-25 and pages 33-34 of Alphabet's 2022 Proxy Statement (https://www.sec.gov/Archives/edgar/data/1652044/000130817922000262/lgoog2022_def14a.htm).	<Not Applicable>	<Not Applicable>

C1.2

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

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

C1.2a

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

Primary responsibility for managing climate-related issues is delegated to our CSO, who leads sustainability across Google's worldwide operations, products, and supply chain and ensures alignment of our climate strategy across different business units. Our CSO reports up to our Chief Financial Officer (CFO) and provides updates as needed. The CSO 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 credits management, our 10+ year commitment to carbon neutrality, our climate resilience strategy (including our climate scenario analysis), climate-related disclosures, engagement with employees on sustainability issues, and our work to enable people to live more sustainably via our core products.

Our CSO 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, among others. Our CSO 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 CSO also coordinates development and monitoring of company-wide sustainability objectives and targets, including financial planning. Lastly, our CSO 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 CSO has engaged with the European Commission and various federal agencies about Google's sustainability initiatives, as well as with municipal officials in the San Francisco Bay Area and other cities about climate resilience.

Our CSO 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 our data centers represent the vast majority of our electricity use, Google's Senior VP of Technical Infrastructure has a strong interest in improving energy efficiency, leading Google's work to purchase renewable energy for our operations, and working towards our goal of operating on carbon-free energy 24/7 by 2030.

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

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

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

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

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

C1.3

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

	Provide incentives for the management of climate-related issues	Comment
Row 1	Yes	In 2022, we adopted an Environmental, Social, and Governance Bonus (ESG Bonus) for members of Google's senior executive team. The ESG Bonus provides individual participants with an annual cash bonus opportunity, based on contributions to Google's performance against social and environmental goals.

C1.3a

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

Entitled to incentive	Type of incentive	Activity incentivized	Comment
Corporate executive team	Monetary reward	Emissions reduction target	In 2022, we adopted an Environmental, Social, and Governance Bonus (ESG Bonus) for members of Google's senior executive team. The ESG Bonus provides individual participants with an annual cash bonus opportunity, based on contributions to Google's performance against social and environmental goals.

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?

We define "substantive financial or strategic impact" for the purpose of CDP reporting as climate-related risks and/or opportunities that have a strong possibility of occurring and would be important to our business, reputation, financial condition, and operating results. Examples of factors that can have a substantive impact include macro-economic, political, and event risks and opportunities, as well as business-specific risks and opportunities related to strategy and competition, all of which can be influenced by climate change. In determining whether a climate-related risk and/or opportunity is substantive for the purpose of CDP reporting, one metric we may consider is its quantitative impact relative to 5% of our net income.

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

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

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

One of our risk mitigation activities is our work to procure renewable energy for our operations via long-term contracts with stable prices. In 2019, we announced a 1.6 GW package of agreements that represents our biggest commitment ever to purchase renewable energy—and the largest such announcement made by any corporation at the time. As of 2021, the total capacity of our renewable energy projects under contract was more than 7 GW.

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

Creating a carbon-free energy system in which any organization has access to a simple and cost-effective marketplace is achievable only through large-scale, coordinated action—and we know we can't do it alone. In 2019, Google helped lead the establishment of the Clean Energy Buyers Association (CEBA), formerly known as Renewable Energy Buyers Alliance (REBA), the world's largest organization of corporate clean energy buyers. As a founding member of CEBA, we're leading an effort to bring together nearly 300 energy customers and partners to pave the way for any company to access and purchase renewable energy. Collectively, this group is committed to achieving a 90% carbon-free U.S. electricity system by 2030.

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). iii) Description of process: On behalf of Alphabet and Google's CFO and Google's Senior VP of Technical Infrastructure, our CSO collaborates with risk management and operations teams on a company-wide risk management process to ensure risks and opportunities are identified and evaluated across the company for mitigation of and adaptation to climate change. Geographical areas considered in risk and opportunities management include Google's Bay Area headquarters, its major global office operations, and 23 global data center locations. Results of risk and opportunity assessments are reported to a cross-functional group of key internal stakeholders, including executives in operations and finance. The scope of the process considers regulatory risks due to climate change that could increase energy costs, across all of Alphabet's operations globally. Results are reported to the CFO for Alphabet and Google, who can bring up climate-related issues to the Board as needed. These risks and opportunities are primarily assessed at a company level by modeling likely future energy cost scenarios under climate change regulation, and applying these scenarios to estimate the cost impact to our overall operations. In an effort to mitigate these risks and to work towards our goal of operating on carbon-free energy on a 24/7 basis by 2030, we look for opportunities to procure renewable energy via long-term contracts with stable prices, such as power purchase agreements (PPAs). From 2010 to 2021, we signed more than 60 agreements totaling more than 7 GW of renewable energy. Over the past decade, Google purchased more renewable energy than any other company, based on cumulative renewable electricity purchased in megawatt-hours (MWh) from 2012 to 2021. There are many elements we consider in deciding where and how to pursue renewable energy supply contracts, including the emissions reduction potential of sourcing renewable energy by displacing electricity with a high carbon intensity and the cost-competitiveness of renewable energy over the long term. Regarding energy costs specifically, we evaluate the net present value of entering into a renewable energy supply contract by comparing the business-as-usual scenario to energy costs under the long-term clean energy scenario. Clean energy projects are commercially attractive if we find that they will significantly reduce the carbon intensity of our electricity supply and are likely to be more economical over the long-term. Under such circumstances, we may decide to enter into a long-term contract. Long-term renewable energy contracts are one of the most important tools we have in mitigating risk and providing opportunity with respect to climate change, because they can reduce emissions while keeping energy costs known and manageable. Risks and opportunities are also assessed at an asset level by using the same models applied to both transition risks and physical risks. For our global office locations, Google assesses risk and opportunity based on specific climate risk factors. To prioritize each risk and opportunity identified, we consider three key factors: its potential impact on our financial bottom line, its potential impact to our company's reputation, and progress towards our 24/7 carbon-free energy and greenhouse gas emissions reduction targets. We weigh these and other factors on a case by case basis, depending on the risk/opportunity being prioritized. As an example of a process used to identify climate-related risks, in 2020, Google conducted an updated climate risk assessment, building on the previous risk assessment that was conducted in 2017. This included climate scenario analysis, referencing RCP 4.5 and 8.5, and an assessment of the impact of flooding, water stress, extreme heat, and wildfires on 26 priority office sites and 23 data center locations. The key result of this scenario analysis was that increased exposure to extreme heat and flooding is likely to impact many of our global offices and data centers as early as 2030 (if not sooner). Since flooding and extreme heat emerged as critical climate risks that could have a significant impact on physical assets and occupants, they have been considered as part of the overall development strategy for Google's expanding footprint. As an example of a case study from a physical risk perspective, we launched Google's Ecology Program in 2014 with the goal of enhancing ecological resilience, focusing on the following objectives: expanding wildlife habitat, creating diverse landscapes that can withstand the stresses of climate change, and restoring many of the ecological functions lost with the development of office parks across Silicon Valley. We leveraged cutting-edge science and data to create the Landscape Resilience Framework for ecological planning in the region, in partnership with the San Francisco Estuary Institute. We engaged with ecologists, landscape architects, planners, and local nongovernmental organizations to ensure that our outdoor environments would enhance the region's ecology over time. As a result, Google has planted 1.4 acres of native vegetation in our "Green Loop," added roughly 5.9 acres of riparian habitat and 1,800 native trees to the Charleston Retention Basin, and designed our Bay View site like a bay's edge, with large meadows, emergent and freshwater marsh, and one of the largest willow groves ever planted in the region. For more information on Google's Urban Ecology program, see: <https://sustainability.google/projects/urban-ecology/> As another example from a transition risk perspective, running our business requires us to use a lot of energy to power our data centers, offices, and other infrastructure. In 2021, our total energy consumption was 18,571,659 MWh. Google faces the risk of increased costs of energy if a price on carbon is applied through legislation such as cap and trade (or other mechanisms such as taxation). We use carbon intensity as part of our risk assessment evaluation to support strategic decision-making related to future capital investments. To mitigate this risk, we operate some of the most efficient data centers in the world, procure carbon-free energy for our operations, and generate onsite renewable energy at several of our offices and at our data centers. Finally, we reach carbon neutrality for our operations via three steps: energy efficiency, renewable energy procurement, and purchasing high-quality carbon credits for any remaining emissions we haven't yet eliminated.

C2.2a

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

	Relevance & inclusion	Please explain

	Relevance & inclusion	Please explain
Current regulation	Relevant, always included	New regulations, laws, policies, and international accords relating to environmental and social matters, including sustainability, climate change, human capital, and diversity, are being developed and formalized in Europe, the U.S., and elsewhere, which may entail specific, target driven frameworks and/or disclosure requirements. We have implemented robust environmental and social programs, adopted reporting frameworks and principles, and announced a number of goals and initiatives, including those related to environmental sustainability and diversity. The implementation of these goals and initiatives may require considerable investments, and our goals, with all of their contingencies, dependencies, and in certain cases, reliance on third-party verification and/or performance, are complex and ambitious, and we cannot guarantee that we will achieve them. Additionally, there can be no assurance that our current programs, reporting frameworks, and principles will be in compliance with any new environmental and social laws and regulations that may be promulgated in the U.S. and elsewhere, and the costs of changing any of our current practices to comply with any new legal and regulatory requirements in the U.S. and elsewhere may be substantial. Furthermore, industry and market practices may further develop to become even more robust than what is required under any new laws and regulations, and we may have to expend significant efforts and resources to keep up with market trends and stay competitive among our peers. As an example, we are closely monitoring state renewable energy and clean energy standards in the United States. We see these policies as critical to help drive low-carbon power sources in states where we have offices and data centers. An elimination of policies that enable corporate end users to purchase clean energy would make it more difficult for Google to meet its carbon-free energy goals by decreasing access to renewable energy in states where we operate. This would mean we would have to find other alternatives to procure carbon-free energy, which could be more expensive or located outside of the grids where we operate. For example, in 2019, Ohio rolled back their renewable energy portfolio standards from 12.5% to 8.5%, which added an additional hurdle to Google's ability to source renewable energy for our Ohio data center site over the long term.
Emerging regulation	Relevant, always included	New regulations, laws, policies, and international accords relating to environmental and social matters, including sustainability, climate change, human capital, and diversity, are being developed and formalized in Europe, the U.S., and elsewhere, which may entail specific, target driven frameworks and/or disclosure requirements. We have implemented robust environmental and social programs, adopted reporting frameworks and principles, and announced a number of goals and initiatives, including those related to environmental sustainability and diversity. The implementation of these goals and initiatives may require considerable investments, and our goals, with all of their contingencies, dependencies, and in certain cases, reliance on third-party verification and/or performance, are complex and ambitious, and we cannot guarantee that we will achieve them. Additionally, there can be no assurance that our current programs, reporting frameworks, and principles will be in compliance with any new environmental and social laws and regulations that may be promulgated in the U.S. and elsewhere, and the costs of changing any of our current practices to comply with any new legal and regulatory requirements in the U.S. and elsewhere may be substantial. As an example, we have few direct emissions of greenhouse gases relative to our indirect emissions, therefore we do not expect our operations to be directly impacted by climate policy in the United States, nor do we expect to participate in any current or future compliance markets for carbon trading in the United States. Google does, however, face the risk of increased costs of energy if a price on carbon is applied through legislation such as cap and trade (or other mechanisms such as taxation). Running our business requires us to use a lot of energy to power our data centers, offices, and other infrastructure. In 2021, our total energy consumption was 18,571,659 MWh. To the extent that a price on carbon is applied through legislation and passed on to us from a regulated entity, the cost of running our operations would likely increase. Our risk assessments at individual data centers include using a shadow price for carbon to estimate expected future energy costs.
Technology	Relevant, always included	The availability of our products and services and fulfillment of our customer contracts depend on the continuing operation of our information technology and communications systems. Our systems are vulnerable to damage, interference, or interruption from modifications or upgrades, terrorist attacks, natural disasters or pandemics, the effects of climate change (such as sea level rise, drought, flooding, heat waves, wildfires and resultant air quality effects and power shutoffs associated with wildfire prevention, and increased storm severity), power loss, telecommunications failures, computer viruses, ransomware attacks, computer denial of service attacks, phishing schemes, or other attempts to harm or access our systems. An example of a potential technology-related risk could be maintaining the environmental performance of data centers as demand for digital products, and the amount of compute needed to power these applications, increases dramatically. However, we've worked for more than a decade to make Google data centers some of the most efficient in the world. We outfit each data center with high-performance servers that we've custom-designed to use as little energy as possible. We improve facility energy use by installing smart temperature and lighting controls and redesigning how power is distributed to reduce energy loss. We're also applying machine learning to drive energy efficiency even further and automatically optimize cooling. As a result, a Google data center is, on average, twice as energy efficient as a typical enterprise data center, and compared with five years ago, we now deliver around five times as much computing power with the same amount of electrical power. Given these initiatives, we mitigate risks through technological improvements or innovations that support the transition to a lower-carbon, energy-efficient economic system.
Legal	Relevant, sometimes included	New regulations, laws, policies, and international accords relating to environmental and social matters, including sustainability, climate change, human capital, and diversity, are being developed and formalized in Europe, the U.S., and elsewhere, which may entail specific, target driven frameworks and/or disclosure requirements. We have implemented robust environmental and social programs, adopted reporting frameworks and principles, and announced a number of goals and initiatives, including those related to environmental sustainability and diversity. Additionally, there can be no assurance that our current programs, reporting frameworks, and principles will be in compliance with any new environmental and social laws and regulations that may be promulgated in the U.S. and elsewhere, and the costs of changing any of our current practices to comply with any new legal and regulatory requirements in the U.S. and elsewhere may be substantial. An example of a potential legal risk could be climate-related litigation associated with lack of compliance with environmental regulations. However, we monitor current and emerging regulations to assess risks and ensure compliance. We also pursue many voluntary sustainability certifications that demonstrate that we're going beyond compliance. For example, we pursue and align with voluntary certifications for our operations and products, including the ISO 50001 certified energy management system for select data centers and Leadership in Energy and Environmental Design (LEED) certifications for select offices. We also support greener electronics standards and certifications, including UL 110, IEEE 1680.1, and the Electronic Product Environmental Assessment Tool (EPEAT). In February 2017, the Nest Learning Thermostat became the first smart thermostat to achieve ENERGY STAR certification by the EPA. Our other products with ENERGY STAR certification include Pixelbook Go and the Nest Thermostat. Google also supports public policies that strengthen global climate action efforts through the UNFCCC Conference of Parties, G20, & other multilateral forums, as well as policies that establish emissions-reduction targets and technology-neutral pathways to achieve a carbon-free economy in line with the IPCC guidance and scientific consensus. We also support policies that ensure the clean energy economy provides economic growth for all, spurs a new generation of green jobs, & benefits the communities most impacted by a changing climate.
Market	Relevant, sometimes included	In 2019, the National Bureau of Economic Research published a study on the long-term macroeconomic effects of climate change, which found that increases in average global temperatures could result in GDP per capita declines of up to 10.5% for the United States and 4.6% for the European Union by 2100 due to changes in labor productivity, among other factors. Throughout 2020, climate-related events including devastating floods, extreme droughts, and wildfires, impacted communities and caused economic disruptions around the world. Fluctuating socio-economic conditions due to climate change could have a negative impact on Google's revenue if they cause users to reduce the rate of economic transactions and thus cause advertisers to demand less online advertising. Alphabet generated more than 80% (more than \$209,000,000,000) of total revenues from the display of ads online in 2021. 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 2021 Best Global Brands report, produced independently by Interbrand, ranks Google as the fourth most valuable global brand. Negative reputation could result in a decrease in brand value and in a loss of future brand equity. This risk driver could have a negative impact on our brands. For example, Interbrand's 2021 Best Global Brands report estimates Google's brand value at approximately \$196 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 \$196 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	The availability of our products and services and fulfillment of our customer contracts depend on the continuing operation of our information technology and communications systems. Our systems are vulnerable to damage, interference, or interruption from modifications or upgrades, terrorist attacks, natural disasters or pandemics, the effects of climate change (such as sea level rise, drought, flooding, heat waves, wildfires and resultant air quality effects and power shutoffs associated with wildfire prevention, and increased storm severity), power loss, telecommunications failures, computer viruses, ransomware attacks, computer denial of service attacks, phishing schemes, or other attempts to harm or access our systems. In 2017, we conducted an assessment of Google's exposure to climate risk in the near-term (2020-2025), mid-term (2050), and long-term (2100). This included a global assessment of the impact of sea level rise, precipitation (flooding), precipitation (drought), temperature and water stress on our real estate operations. Based on this assessment, we found our biggest risk to be flooding at our Bay Area headquarters. In 2020, we conducted an updated global assessment of near-term (2030) and mid-term (2050) climate risks, including the impacts of flooding, extreme heat and water stress, as well as a special focus on wildfires in applicable locations. Based on this updated assessment, we found exposure to flooding and extreme heat across the portfolio to be our biggest risks. Our 2020 assessment suggested that these trends are likely to increase and continue through the end of the century.
Chronic physical	Relevant, sometimes included	We must cool our data centers to keep them in operation, and the amount of energy needed to cool them is related to the outside air temperature. If global temperatures increase, this will increase the amount of energy required to cool our data centers and increase the cost of running our operations. Given that climate change is expected to increase average temperatures globally and we have facilities and operations around the world, this is a risk that we face at all of our facilities globally. In particular, this may impact our data centers located in warm climates, such as our data center in Singapore. As of December 31, 2021, Google had 23 data center locations across North America, South America, Europe, and Asia. To learn more about our data centers and their locations, see: https://www.google.com/about/datacenters/locations/ . In general, we expect that our data center cooling costs will go up if there were an 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 noticeable rise in our cooling costs, assuming we were not further able to improve our energy efficiency. This would have a low-to-medium negative financial impact. In 2020, Google conducted an updated climate risk assessment, building on the previous risk assessment that was conducted in 2017. This included climate scenario analysis, referencing RCP 4.5 and 8.5, and an assessment of the impact of flooding, water stress, extreme heat and wildfires on 26 priority office sites and 23 data center locations.

C2.3

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

Yes

(C2.3a) 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

i) Description of risk: We have few direct emissions of greenhouse gases relative to our indirect emissions, therefore we do not expect our operations to be directly impacted by climate policy in the US, nor do we expect to participate in any current or future compliance markets for carbon trading in the US. Running our business requires us to use a lot of electricity to power our data centers, offices, and other infrastructure. We have offices and data centers in over 190 cities in primarily across North America, Europe, South America, and Asia, including 23 data center locations, as well as approximately 30 Google Cloud regions. In 2021, our total energy consumption was 18,571,659 MWh. Therefore, Google does face the risk of increased costs of energy if a price on carbon is applied through legislation such as cap and trade (or other mechanisms such as taxation).

Time horizon

Short-term

Likelihood

Unlikely

Magnitude of impact

Low

Are you able to provide a potential financial impact figure?

Yes, a single figure estimate

Potential financial impact figure (currency)

95000000

Potential financial impact figure – minimum (currency)

<Not Applicable>

Potential financial impact figure – maximum (currency)

<Not Applicable>

Explanation of financial impact figure

ii) Potential financial impact figure & breakdown: As a hypothetical example, if a carbon price of e.g. \$51/metric tonne were established through regulation (social cost of carbon recommended by the U.S. Federal Government), this could increase our costs by approximately \$95 million, assuming these costs were passed through to electricity consumers and we were not further able to reduce our carbon footprint. This was calculated by adding our 2021 Scope 1 and 2021 Scope 2 market-based emissions, and then multiplying by the aforementioned carbon price example [= (2021 Scope 1 + market-based Scope 2) x \$51]. The financial impact would likely be less as we already voluntarily purchase carbon credits. 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

iii) Case study: As an example of a case study, 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 2021, 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 1.57. We achieved this through the use of increasingly efficient power supplies, evaporative cooling technology, machine learning, and other innovations. Timescale of implementation: Ongoing An additional risk mitigation activity is our work to procure renewable energy for our operations via long-term contracts with stable prices. In 2019, we announced a 1.6 GW package of agreements that represents our biggest commitment ever to purchase renewable energy—and the largest such announcement made by any corporation at the time. By the end of 2021, Google had signed more than 60 renewable energy agreements, which will provide more than 7 GW of renewable energy. iv) Cost figure & breakdown: Though there is an up-front capital cost associated with our data center efficiency improvements, these projects have financial paybacks because they improve our energy efficiency and thus reduce our operational costs. From a net point of view, these improvements therefore come at zero net cost, so our cost of response to this risk is \$0.

Comment

Identifier

Risk 2

Where in the value chain does the risk driver occur?

Direct operations

Risk type & Primary climate-related risk driver

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

Primary potential financial impact

Decreased revenues due to reduced demand for products and services

Climate risk type mapped to traditional financial services industry risk classification

<Not Applicable>

Company-specific description

We have always been a company committed to building helpful products that can improve the lives of millions of people. Our product innovations have made our services widely used, and our brand one of the most recognized in the world. Google Services' core products and platforms include ads, Android, Chrome, hardware, Gmail, Google Drive, Google Maps, Google Photos, Google Play, Search, and YouTube, each with broad and growing adoption by users around the world. Google Cloud includes Google's infrastructure and platform services, collaboration tools, and other services for enterprise customers. i) Description of risk: Insufficiently addressing potential climate change risks and impacts could result in reduced demand for our goods and services due to negative reputation impact associated with limited transparency, among other factors. We discuss these risks and impacts and share how we're addressing them through our sustainability initiatives in our public disclosures, such as Alphabet's CDP Climate Change response and Google's Environmental Report, and via our website, sustainability.google. As an example, in Google's Environmental Report, we discuss the risks associated with global challenges such as climate change and extreme weather events, and share more details about how we're working to find new ways for technology to be helpful at the most critical times, through services such as flood forecasting, wildfire mapping, and earthquake detection. Through white papers, case studies, and blog posts, we work to establish transparency and share best practices to help others do the same. The 2021 Best Global Brands report, produced independently by Interbrand, ranks Google as the fourth most valuable global brand, valued at approximately \$196 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)

196000000

Potential financial impact figure – minimum (currency)

<Not Applicable>

Potential financial impact figure – maximum (currency)

<Not Applicable>

Explanation of financial impact figure

ii) Potential financial impact figure & breakdown: This risk driver could have a negative impact on our brands. For example, the 2021 Best Global Brands report, produced independently by Interbrand, estimates Google's brand value at approximately \$196 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 \$196 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

15000000

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. 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. iii) Case study: As an example of a case study, to increase transparency, build awareness of our sustainability initiatives, and help others looking to implement similar initiatives, we share our best practices through Google's Environmental Report, as well as through white papers and blog posts on sustainability.google. In 2019, we published a case study on accelerating RE purchasing through auctions, where we shared details about how our RE auction worked and the lessons we learned along the way in the lead up to our 2019 announcement of making the biggest corporate purchase of renewable energy in history at the time. We have also published a white paper that provides a detailed overview of our current carbon-free energy framework and methodology. As a result, we hope that these resources help other companies and consumers envision how they too can set goals to move closer to 24/7 carbon-free energy and maximize their impact on grid decarbonization. Timescale of implementation: Ongoing iv) Cost figure & breakdown: Google has various significant longstanding and ongoing investments in sustainability, some of which have been announced publicly, while other investments remain confidential. In addition to these investments, one of the costs associated with properly addressing climate change opportunities and impacts is the staff time to manage key initiatives on sustainability, energy efficiency, and renewable energy. As a rough estimate, this may be estimated to be approximately \$15 million per year. This was calculated by multiplying the median employee total compensation for the year ended December 31, 2021 by the estimated number of full-time employee equivalents that would manage these specific initiatives. This hypothetical cost figure may vary over time and may not be representative of the workload resources currently dedicated to these initiatives.

Comment**Identifier**

Risk 3

Where in the value chain does the risk driver occur?

Direct operations

Risk type & Primary climate-related risk driver

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

Primary potential financial impact

Decreased revenues due to reduced demand for products and services

Climate risk type mapped to traditional financial services industry risk classification

<Not Applicable>

Company-specific description

Alphabet generated over 80% of total revenues from the display of online ads in 2021. Advertisers pay Google for the ability to advertise via our Google properties (which includes Google Search and other properties and YouTube ads) and Google Network partners' properties. i) Description of risk: In 2019, the National Bureau of Economic Research published a study on the long-term macroeconomic effects of climate change, which found that increases in average global temperatures could result in GDP per capita declines of up to 10.5% for the United States and 4.6% for the European Union by 2100 due to changes in labor productivity, among other factors. Throughout 2020, climate-related events including devastating floods, extreme droughts, and wildfires, impacted communities and caused economic disruptions around the world. Fluctuating socio-economic conditions due to climate change could have a negative impact on Google's revenue if it causes users to reduce the rate of economic transactions and thus causes advertisers to demand less online advertising.

Time horizon

Medium-term

Likelihood

Unlikely

Magnitude of impact

Medium

Are you able to provide a potential financial impact figure?

Yes, a single figure estimate

Potential financial impact figure (currency)

2090000000

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. ii) Potential financial impact figure & breakdown: It is difficult to predict the magnitude of this risk, given the indirect nature of the relationship between climate change and online consumer economic activity. That said, Alphabet generated over 80% (more than \$209,000,000,000) of total revenues from the display of ads online in 2021. 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. \$2,090,000,000).

Cost of response to risk

15000000

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. iii) Case study: 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, and in 2021, we participated actively in COP26 in Glasgow to support a robust outcome from the conference. As a result, in partnership with the COP26 Presidency, Google livestreamed the activities through YouTube and Google Arts and Culture, which helped COP26 expand the reach of its digital channels. YouTube creators at the conference created content which they shared with their global audiences, and we published video, imagery and artworks from "the green zone" — the center of COP26 activity — via a new page on Google Arts and Culture, inviting people everywhere to learn about the discussions and activities taking place. Timescale of implementation: Ongoing iv) Cost figure & breakdown: Google has various significant longstanding and ongoing investments in sustainability, some of which have been announced publicly, while other investments remain confidential. In addition to these investments, one of the costs associated with properly addressing climate change opportunities and impacts is the staff time to manage key initiatives on sustainability, energy efficiency, and renewable energy. As a rough estimate, this may be estimated to be approximately \$15 million per year. This was calculated by multiplying the median employee total compensation for the year ended December 31, 2021 by the estimated number of full-time employee equivalents that would manage these specific initiatives. This hypothetical cost figure may vary over time and may not be representative of the workload resources currently dedicated to these initiatives.

Comment

Identifier

Risk 4

Where in the value chain does the risk driver occur?

Direct operations

Risk type & Primary climate-related risk driver

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

Primary potential financial impact

Increased indirect (operating) costs

Climate risk type mapped to traditional financial services industry risk classification

<Not Applicable>

Company-specific description

i) Description of risk: Running our business requires us to use a lot of energy to power our data centers, offices, and other infrastructure. In 2021, our total energy consumption was 18,571,659 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 11 years ago and Google has benefitted from this price reduction. In 2020, we launched our third decade of climate action with a new set of audacious commitments: By 2030, we aim to become the first major company to operate on carbon-free energy 24/7. Therefore, Google could face the risk of increased costs to meet its carbon-free energy goals if we have decreased access to procure renewable energy in places where we operate.

Time horizon

Short-term

Likelihood

More likely than not

Magnitude of impact

Medium

Are you able to provide a potential financial impact figure?

Yes, a single figure estimate

Potential financial impact figure (currency)

0

Potential financial impact figure – minimum (currency)

<Not Applicable>

Potential financial impact figure – maximum (currency)

<Not Applicable>

Explanation of financial impact figure

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

Cost of response to risk

15000000

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. iii) Case study: As an example of a case study, members of Google's energy and public policy teams have engaged directly with policymakers from the U.S. (including the White House, the U.S. Congress and Governors), the European Union, and other countries to call for policies that promote renewable energy and/or reduce carbon emissions. In 2019, this included signing a letter sent by the RE-Source Platform to the European Commission, urging them to prioritize the removal of barriers to corporate renewable energy PPAs in their evaluation of member states' energy plans. As a result, one week after the RE-Source letter was sent, the draft Commission Assessment of these national energy plans was released and it urged member states to introduce specific policies and measures to facilitate the uptake of PPAs. In 2020, we collaborated with other corporate renewable energy buyers and project developers via the RE-Source Platform to develop and advocate a joint policy position to enable Corporate Power Purchase Agreements to play a greater role in delivering the EU Green Deal. We advocated for the RE-Source Platform to play a stronger role on energy policy advocacy, which contributed to the creation of a dedicated policy working group within RE-Source. iv) Cost figure & breakdown: Google has various significant longstanding and ongoing investments in sustainability, some of which have been announced publicly, while other investments remain confidential. In addition to these investments, one of the costs associated with properly addressing climate change opportunities and impacts is the staff time to manage key initiatives on sustainability, energy efficiency, and renewable energy. As a rough estimate, this may be estimated to be approximately \$15 million per year. This was calculated by multiplying the median employee total compensation for the year ended December 31, 2021 by the estimated number of full-time employee equivalents that would manage these specific initiatives. This hypothetical cost figure may vary over time and may not be representative of the workload resources currently dedicated to these initiatives.

Comment**Identifier**

Risk 5

Where in the value chain does the risk driver occur?

Direct operations

Risk type & Primary climate-related risk driver

Acute physical	Other, please specify (Increased severity 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

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

Time horizon

Long-term

Likelihood

Likely

Magnitude of impact

Medium

Are you able to provide a potential financial impact figure?

Yes, a single figure estimate

Potential financial impact figure (currency)

0

Potential financial impact figure – minimum (currency)

<Not Applicable>

Potential financial impact figure – maximum (currency)

<Not Applicable>

Explanation of financial impact figure

We define "substantive financial or strategic impact" for the purpose of CDP reporting as climate-related risks and/or opportunities that have a strong possibility of occurring and would be important to our business, reputation, financial condition, and operating results. Examples of factors that can have a substantive impact include macro-economic, political, and event risks and opportunities, as well as business-specific risks and opportunities related to strategy and competition, all of which can be influenced by climate change. ii) Potential financial impact figure: 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. Flooding and extreme heat have been identified as climate risks that could have a significant impact on physical assets, and have been considered as part of the overall development strategy. To determine and manage the significance of climate-related risks in relation to other risks, we have evaluated risk from a triple bottom line perspective, including environment, financial and social impacts. As a result, we are addressing risk through a number of ecological approaches. iii) Case study: As an example of a case study, when we launched Google's Ecology Program in 2014, our goal was to enhance ecological resilience. We leveraged cutting-edge science and data to create the Landscape Resilience Framework for ecological planning in the region, in partnership with the San Francisco Estuary Institute. We engaged with ecologists, landscape architects, planners, and local nongovernmental organizations to ensure that our outdoor environments would enhance the region's existing ecology over time. Together, we focused on the following objectives: expanding wildlife habitat, creating diverse landscapes that can withstand the stresses of climate change, and restoring many of the ecological functions lost with the development of office parks across Silicon Valley. As a result, Google has planted 1.4 acres of native vegetation in our "Green Loop," added roughly 5.9 acres of riparian habitat and 1,800 native trees to the Charleston Retention Basin, and designed our Bay View site like a bay's edge, with large meadows, emergent and freshwater marsh, and one of the largest willow groves ever planted in the region. For more information on Google's Urban Ecology program, see: <https://sustainability.google/projects/urban-ecology/> iv) Cost figure: 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	Other, please specify (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

i) Description of risk: 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, 2021, Google had 23 data center locations across North America, South America, Europe, and Asia. To learn more about our data centers and their locations, see: <https://www.google.com/about/datacenters/inside/locations>

Time horizon

Medium-term

Likelihood

Very likely

Magnitude of impact

Medium-low

Are you able to provide a potential financial impact figure?

Yes, a single figure estimate

Potential financial impact figure (currency)

0

Potential financial impact figure – minimum (currency)

<Not Applicable>

Potential financial impact figure – maximum (currency)

<Not Applicable>

Explanation of financial impact figure

In general, we expect that our cooling costs will go up if there were an 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 noticeable 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. ii) Potential financial impact figure: 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

iii) Case study: 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 2021, 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 1.57. 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. iv) Cost figure & breakdown: 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

i) Description of opportunity: Any regulation that imposes a price on carbon or regulates carbon emissions may incentivize customers to switch their technology infrastructure to Google Workspace and take advantage of Google's cloud, which is highly energy efficient and is carbon neutral. This could create additional demand for Google's existing products and/or services. An example of one such regulation that could impact our operations is the European Emissions Trading System (EU ETS) that regulates carbon emissions across several sectors of the European Economy. Google has six data centers in Europe, in Belgium, Denmark, Finland, Ireland, and the Netherlands. 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)

19200000

Potential financial impact figure – minimum (currency)

<Not Applicable>

Potential financial impact figure – maximum (currency)

<Not Applicable>

Explanation of financial impact figure

ii) Potential financial impact figure & breakdown: 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 advantage for Google Cloud and yielded an unpredictable 0.1% increase in Google Cloud revenue, it is hypothetically possible that we could experience a similar increase in annual Google Cloud revenue. Based on our FY2021 Google Cloud revenue of \$19.2 billion, 0.1% would equate to approximately \$19.2 million.

Cost to realize opportunity

15000000

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. In 2013, we became the first company in North America—and the only major internet company—to achieve a multi-site energy management system certification to ISO 50001. As of 2021, we have maintained our ISO 50001 certification for our operational European data centers. iii) Case study: As an example of a case study, we're working to support transition of the world's power to more renewables like wind and solar. By the end of 2021, we had signed more than 60 agreements totaling more than 7 GW of renewable energy. We're also working with our utility partners to find solutions that will make more renewable energy available for us and for others. As a result, we're making our products and services more efficient and matching our electricity use with renewable energy. In 2020, we committed to aim to operate on carbon-free energy 24/7 by 2030 and to enable 5 gigawatts of new carbon-free energy across our key manufacturing regions through investment. Timescale of implementation: Ongoing iv) Cost figure & breakdown: Google has various significant longstanding and ongoing investments in sustainability, some of which have been announced publicly, while other investments remain confidential. In addition to these investments, one of the costs associated with properly addressing climate change opportunities and impacts is the staff time to manage

key initiatives on sustainability, energy efficiency, and renewable energy. As a rough estimate, this may be estimated to be approximately \$15 million per year. This was calculated by multiplying the median employee total compensation for the year ended December 31, 2021 by the estimated number of full-time employee equivalents that would manage these specific initiatives. This hypothetical cost figure may vary over time and may not be representative of the workload resources currently dedicated to these initiatives.

Comment

Identifier

Opp2

Where in the value chain does the opportunity occur?

Downstream

Opportunity type

Products and services

Primary climate-related opportunity driver

Development and/or expansion of low emission goods and services

Primary potential financial impact

Increased revenues resulting from increased demand for products and services

Company-specific description

i) Description of opportunity: Addressing climate change opportunities head on could result in an increased demand for our goods and services by positively impacting our reputation. We have always been a company committed to building helpful products that can improve the lives of millions of people. Our product innovations have made our services widely used, and our brand one of the most recognized in the world. Google Services' core products and platforms include ads, Android, Chrome, hardware, Gmail, Google Drive, Google Maps, Google Photos, Google Play, Search, and YouTube, each with broad and growing adoption by users around the world. Google Cloud includes Google's infrastructure and platform services, collaboration tools, and other services for enterprise customers. We own and lease additional office and building space, research and development labs, sales and support offices, and data centers across more than 190 cities primarily in North America, Europe, South America, and Asia, including 23 data center locations across four continents. In 2021, we matched 100% of our global electricity use with purchases of renewable energy for the fifth year in a row, which could positively impact our reputation in regions where we operate. In 2020, we set a goal to help 1 billion people make more sustainable choices through our core products by 2022.

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)

257600000

Potential financial impact figure – minimum (currency)

<Not Applicable>

Potential financial impact figure – maximum (currency)

<Not Applicable>

Explanation of financial impact figure

ii) Potential financial impact figure & breakdown: This opportunity driver could have a positive impact on our revenue. For illustrative purposes, if an increase in our reputation 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 FY2021 revenue of \$257.6 billion, 0.1% would equate to approximately \$257.6 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

15000000

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. ii) Case study (1): As an example of a case study, as demand increases for information about alternative transportation options, there may be more users of Google Maps and Google Transit. Therefore, we continue to add new features and cities to Google Maps to help people better understand and reduce their personal environmental impact. Google Maps has transit information for more than 12,000 agencies, running through more than 4.7 million transit stations, in over 120 countries. As a result, Google Maps provides, on average, more than 1 billion km worth of transit results every day. ii) Case study (2): As another example, Google works to accelerate the development of renewable energy by procuring renewable energy for our operations and through renewable energy investments; to promote electricity market reforms that unlock access to carbon-free power around the world; and to build and run some of the most efficient data centers in the world. As a result, all these efforts can have positive impacts on our reputation and potentially increase demand for Google's products and services. In 2020, we committed to aim to operate on carbon-free energy 24/7 by 2030 and to enable 5 gigawatts of new carbon-free energy across our key manufacturing regions through investment. Timescale of implementation: Ongoing iv) Cost figure & breakdown: Google has various significant longstanding and ongoing investments in sustainability, some of which have been announced publicly, while other investments remain confidential. In addition to these investments, one of the costs associated with properly addressing climate change opportunities and impacts is the staff time to manage key initiatives on sustainability, energy efficiency, and renewable energy. As a rough estimate, this may be estimated to be approximately \$15 million per year. This was calculated by multiplying the median employee total compensation for the year ended December 31, 2021 by the estimated number of full-time employee equivalents that would manage these specific initiatives. This hypothetical cost figure may vary over time and may not be representative of the workload resources currently dedicated to these initiatives.

Comment

Identifier

Opp3

Where in the value chain does the opportunity occur?

Downstream

Opportunity type

Products and services

Primary climate-related opportunity driver

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

Primary potential financial impact

Increased revenues resulting from increased demand for products and services

Company-specific description

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

Time horizon

Short-term

Likelihood

Virtually certain

Magnitude of impact

Medium

Are you able to provide a potential financial impact figure?

Yes, a single figure estimate

Potential financial impact figure (currency)

196000000

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. 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. ii) Potential financial impact figure & breakdown: This opportunity driver could have a positive impact on our brands. For example, the 2021 Best Global Brands report, produced independently by Interbrand, estimates Google's brand value at approximately \$196 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 \$196 million via brand loyalty created by wider social benefits. 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

0

Strategy to realize opportunity and explanation of cost calculation

Google Earth Engine was developed to bring together the world's satellite imagery and make it available online with tools for scientists, independent researchers, and nations. Earth Engine has enabled tens of thousands of active users around the world to easily analyze over 52 petabytes of freely available geospatial information, resulting in a deeper understanding of the planet. Using this technology platform, we're helping scientists develop applications for detecting deforestation and mapping land use trends, and have started working with individual countries to develop their own applications. iii) Case study: We put Google technology to work helping others study and respond to environmental challenges. As an example of a case study, in 2018, Google launched the Environmental Insights Explorer (EIE)—an online tool that uses exclusive data sources and modeling capabilities in a freely available platform to help cities measure emission sources, run analyses, and identify strategies to reduce emissions. By the end of 2021, nearly 42,000 cities and regions worldwide were covered by the EIE. As a result, we've empowered city planners and policymakers with EIE to make it easier for cities to measure progress against their climate action plans. The cities of Hamburg, Germany; Hartford, Connecticut, United States; Kyoto, Japan; and Melbourne, Australia, are just a few leading examples of how access to innovative data sources for measuring and tracking impacts of GHG emissions helps cities act in a timely, effective way. In 2020, we committed to helping more than 500 cities and local governments globally reduce an aggregate of 1 gigaton of carbon emissions annually by 2030, using EIE to support local climate action planning. iv) Cost figure: In addition to Google's significant longstanding and ongoing investments in sustainability, some of the costs associated with our Earth Engine and Environmental Insights Explorer efforts are staff time to manage software development as well as data storage and processing (i.e. running scientific algorithms) in our data centers. These costs are confidential, so we have put \$0 for cost of management.

Comment**Identifier**

Opp4

Where in the value chain does the opportunity occur?

Downstream

Opportunity type

Energy source

Primary climate-related opportunity driver

Shift toward decentralized energy generation

Primary potential financial impact

Returns on investment in low-emission technology

Company-specific description

i) Description of opportunity: With the rising need for energy, we expect renewable energy to play an integral part in the world's energy infrastructure. From 2010 to 2021, Google made commitments to invest nearly \$3.3 billion in renewable energy projects with an expected combined capacity of approximately 8.7 GW. By being an early investor and deploying smart capital to fund utility-scale projects, we have helped accelerate the deployment of the latest clean energy technologies and provided more capital for developers to build additional renewable projects. This is a global opportunity as there are renewable energy opportunities worldwide, across different geographies and technology types. We've invested in large scale renewable energy projects, as well as in funds that help to deploy solar PV panels on residential homes,

where the falling costs of solar PV has made distributed generation much more economic.

Time horizon

Short-term

Likelihood

Very likely

Magnitude of impact

Medium

Are you able to provide a potential financial impact figure?

Yes, a single figure estimate

Potential financial impact figure (currency)

0

Potential financial impact figure – minimum (currency)

<Not Applicable>

Potential financial impact figure – maximum (currency)

<Not Applicable>

Explanation of financial impact figure

The International Energy Agency published a roadmap for the global energy sector in 2021, which estimates that to reach net zero emissions across the global economy by 2050, annual clean energy investment worldwide will need to more than triple by 2030 to around \$4 trillion. This presents a tremendous business opportunity for the private sector to help build a clean energy future. In pursuing this opportunity, from 2010 to 2021, Google made commitments to invest nearly \$3.3 billion in renewable energy projects with an expected combined capacity of approximately 8.7 GW. These targeted investments are beyond our own operational footprint and are expected to result in more than \$15 billion of investment in renewable energy projects when including capital invested by partners (both equity and debt). ii) Potential financial impact figure: We will continue to manage our existing investments. Our ROI is confidential, so we have put \$0 for financial impact.

Cost to realize opportunity

15000000

Strategy to realize opportunity and explanation of cost calculation

iii) Case study: As an example of a case study, in 2010, Google began investing in a clean energy future to help scale renewable energy solutions to meet society's long-term energy needs and to green electrical grids worldwide. From 2010 to 2021, Google has made commitments to invest nearly \$3.3 billion in renewable energy projects with an expected total combined capacity of approximately 8.7 GW (separate from the PPAs we use to purchase renewable energy for our own operations). These investments help deploy renewable energy at scale. In 2020, we made the commitment to invest in and help deploy 5 GW of new clean energy by 2030 in our key supply chain regions (which includes our previous commitments of renewable energy in our key manufacturing regions), bringing our combined commitments to 8.7 GW. As a result, once online, this 5 GW supply chain commitment is expected to avoid global emissions equivalent to taking more than 1 million cars off the road each year and catalyze the additional investment of more than \$5 billion in new wind, solar, and other clean energy technologies. iv) Cost figure & breakdown: Google has various significant longstanding and ongoing investments in sustainability, some of which have been announced publicly, while other investments remain confidential. In addition to these investments, one of the costs associated with properly addressing climate change opportunities and impacts is the staff time to manage key initiatives on sustainability, energy efficiency, and renewable energy. As a rough estimate, this may be estimated to be approximately \$15 million per year. This was calculated by multiplying the median employee total compensation for the year ended December 31, 2021 by the estimated number of full-time employee equivalents that would manage these specific initiatives. This hypothetical cost figure may vary over time and may not be representative of the workload resources currently dedicated to these initiatives.

Comment

Identifier

Opp5

Where in the value chain does the opportunity occur?

Downstream

Opportunity type

Energy source

Primary climate-related opportunity driver

Use of lower-emission sources of energy

Primary potential financial impact

Returns on investment in low-emission technology

Company-specific description

i) Description of opportunity: 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. From 2010 to 2021, Google made commitments to invest nearly \$3.3 billion in renewable energy projects with an expected combined capacity of approximately 8.7 GW. These investments help deploy renewable energy at scale.

Time horizon

Short-term

Likelihood

About as likely as not

Magnitude of impact

Medium-high

Are you able to provide a potential financial impact figure?

Yes, a single figure estimate

Potential financial impact figure (currency)

0

Potential financial impact figure – minimum (currency)

<Not Applicable>

Potential financial impact figure – maximum (currency)

<Not Applicable>

Explanation of financial impact figure

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

Cost to realize opportunity

15000000

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. iii) Case study: As an example of a case study, in 2010, Google began investing in a clean energy future to help scale renewable energy solutions to meet society’s long-term energy needs and to green electrical grids worldwide. From 2010 to 2020, Google has made commitments to invest nearly \$3.3 billion in renewable energy projects with an expected total combined capacity of approximately 8.7 GW (separate from the PPAs we use to purchase renewable energy for our own operations). These investments help deploy renewable energy at scale. In 2021, we made the commitment to invest in and help deploy 5 GW of new clean energy by 2030 in our key supply chain regions (which includes our previous commitments of renewable energy in our key manufacturing regions), bringing our combined commitments to 8.7 GW. As a result, once online, this 5 GW supply chain commitment is expected to avoid global emissions equivalent to taking more than 1 million cars off the road each year and catalyze the additional investment of more than \$5 billion in new wind, solar, and other clean energy technologies. iv) Cost figure & breakdown: Google has various significant longstanding and ongoing investments in sustainability, some of which have been announced publicly, while other investments remain confidential. In addition to these investments, one of the costs associated with properly addressing climate change opportunities and impacts is the staff time to manage key initiatives on sustainability, energy efficiency, and renewable energy. As a rough estimate, this may be estimated to be approximately \$15 million per year. This was calculated by multiplying the median employee total compensation for the year ended December 31, 2021 by the estimated number of full-time employee equivalents that would manage these specific initiatives. This hypothetical cost figure may vary over time and may not be representative of the workload resources currently dedicated to these initiatives.

Comment**Identifier**

Opp6

Where in the value chain does the opportunity occur?

Downstream

Opportunity type

Products and services

Primary climate-related opportunity driver

Development and/or expansion of low emission goods and services

Primary potential financial impact

Increased revenues resulting from increased demand for products and services

Company-specific description

i) Description of opportunity: As climate change occurs, energy prices may increase and hence, more consumers may use public and alternative transportation rather than private vehicles. Therefore, there is an opportunity for increased use of Google Maps Transit, which provides public transit directions and walking and biking routes in Google Maps. As can be seen at www.google.com/transit, Google Maps Transit provides maps and schedules for public transit systems in cities worldwide. Google Maps has transit information for more than 12,000 agencies, running through more than 4.7 million transit stations, in over 120 countries. On average, Google Maps provides more than 1 billion km worth of transit results every day.

Time horizon

Short-term

Likelihood

Very likely

Magnitude of impact

Medium-low

Are you able to provide a potential financial impact figure?

Yes, a single figure estimate

Potential financial impact figure (currency)

257600000

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. ii) Potential financial impact figure & breakdown: This opportunity driver could have a positive impact on our revenue. For illustrative purposes, if an increase in our reputation 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 FY2021 revenue of \$257.6 billion, 0.1% would equate to approximately \$257.6 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

0

Strategy to realize opportunity and explanation of cost calculation

Transit on Google Maps is a public transportation trip planning tool for users that combines the latest agency data with the power of Google Maps, and we are continually improving this tool. For agencies around the world, Google Maps is a cost-effective solution targeted at transit novices and seasoned travelers alike. Google Maps is

available in different languages and it is compatible with screen readers for the visually impaired. We've made the Transit and Cycling Directions features on Google Maps available in many countries around the world. iii) Case study: As an example of a case study, as demand increases for information about alternative transportation options, there may be more users of Google Maps and Google Transit. Therefore, we continue to add new features and cities to Google Maps to help people better understand and reduce their personal environmental impact. Google Maps has transit information for more than 12,000 agencies, running through more than 4.7 million transit stations, in over 120 countries. As a result, Google Maps provides, on average, over 1 billion km worth of transit results every day. People can save time and money with Google Maps—getting where they need to be, while minimizing their impact on the environment. We're also enabling users to search for information about electric vehicle charging stations, view live traffic delays for buses, public transit crowdedness predictions, bikeshare information, scooter availability, and first- or last-mile transit directions paired with biking and ridesharing. For more information about how we're helping users minimize their impact on the environment, see our blog posts about transit options, real-time bikeshare information, and EV charging stations on Google Maps: - <https://blog.google/products/maps/hop-on-boardand-go-almost-anywherewith/> - <https://blog.google/products/maps/travel-your-first-and-last-mile-google-maps/> - <https://www.blog.google/products/maps/real-time-bikeshare-information-google-map/> - <https://www.blog.google/products/maps/finding-place-charge-your-ev-easy-google-maps/> iv) Cost figure: In addition to Google's significant longstanding and ongoing investments in sustainability, some of the costs associated with our Google Transit efforts and Google Maps features are the team's staff time on engineering, product management, partner management, and software development. These costs are confidential, so we have put \$0 for cost of management.

Comment

C3. Business Strategy

C3.1

(C3.1) Does your organization's strategy include a transition plan that aligns with a 1.5°C world?

Row 1

Transition plan

Yes, we have a transition plan which aligns with a 1.5°C world

Publicly available transition plan

Yes

Mechanism by which feedback is collected from shareholders on your transition plan

We have a different feedback mechanism in place

Description of feedback mechanism

We proactively engage with our stockholders and other stakeholders throughout the year on a broad range of topics that are of interest and priority to the company and our stockholders. These include business strategy and performance, and environmental, social and governance (ESG) topics such as environmental sustainability, human capital, workforce diversity, executive compensation, and Board leadership and composition. Our engagement enables us to better understand our stockholders' priorities and perspectives, gives us an opportunity to elaborate on our initiatives, policies, and practices, and fosters open and constructive dialogue. We share the feedback from these conversations with our Board, which considers these perspectives as part of its evaluation and review of our practices including those on governance, compensation, and ESG matters. Details about our climate-related initiatives and strategy, which are part of our low-carbon transition plan, have been presented at past Annual Meetings of Stockholders. As an example, our sustainability efforts were highlighted in detail at the 2021 Annual Meeting of Stockholders. Google's Chief Sustainability Officer presented on three key ways that we're working towards creating a carbon-free future for all: Leading at Google, supporting partners, and building sustainability into our core products. In addition, our CEO answered stockholder questions regarding sustainability during the Q&A portion of the Annual Meeting.

Frequency of feedback collection

More frequently than annually

Attach any relevant documents which detail your transition plan (optional)

Carbon Free by 2030 ; 2022 Environmental Report
[google-2022-environmental-report.pdf](#)
[carbon-free-by-2030.pdf](#)

Explain why your organization does not have a transition plan that aligns with a 1.5°C world and any plans to develop one in the future

<Not Applicable>

Explain why climate-related risks and opportunities have not influenced your strategy

<Not Applicable>

C3.2

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

	Use of climate-related scenario analysis to inform strategy	Primary reason why your organization does not use climate-related scenario analysis to inform its strategy	Explain why your organization does not use climate-related scenario analysis to inform its strategy and any plans to use it in the future
Row 1	Yes, qualitative and quantitative	<Not Applicable>	<Not Applicable>

C3.2a

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

Climate-related scenario	Scenario analysis coverage	Temperature alignment of scenario	Parameters, assumptions, analytical choices
Physical climate scenarios	RCP 4.5	Company-wide	<Not Applicable>
Physical climate scenarios	RCP 8.5	Company-wide	<Not Applicable>
Transition scenarios	Bespoke transition scenario	Company-wide	1.5°C

C3.2b

(C3.2b) Provide details of the focal questions your organization seeks to address by using climate-related scenario analysis, and summarize the results with respect to these questions.

Row 1

Focal questions

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). We conducted an updated global assessment of near-term (2030) and mid-term (2050) climate risks in 2020. Some of our focal questions included: - How could climate-related physical risks possibly affect our data centers sites? - How could climate-related physical risks possibly affect our major office locations? - What is our exposure to climate risk in the mid-term and long-term?

Results of the climate-related scenario analysis with respect to the focal questions

In 2020, Google conducted an updated climate risk assessment, building on the previous risk assessment that was conducted in 2017. This included climate scenario analysis, referencing RCP 4.5 and 8.5, and an assessment of the impact of flooding, water stress, extreme heat, and wildfires on 26 priority office sites and 23 data center locations. The focal questions were used to consider geographical areas at risk, such as Google’s Bay Area headquarters, which is located in Mountain View, California, as well as some of our major global offices and global data center locations. The key result of this scenario analysis was that increased exposure to extreme heat and flooding is likely to impact many of our global offices and data centers as early as 2030. Since flooding and extreme heat emerged as critical climate risks that could have a significant impact on physical assets and occupants, they have been considered as part of the overall development strategy for Google’s expanding footprint. We launched Google’s Ecology Program in 2014 with the goal of enhancing ecological resilience, focusing on the following objectives: expanding wildlife habitat, creating diverse landscapes that can withstand the stresses of climate change, and restoring many of the ecological functions lost with the development of office parks across Silicon Valley. We leveraged cutting-edge science and data to create the Landscape Resilience Framework for ecological planning in the region, in partnership with the San Francisco Estuary Institute. We engaged with ecologists, landscape architects, planners, and local nongovernmental organizations to ensure that our outdoor environments would enhance the region’s existing ecology over time. As a result, Google has planted 1.4 acres of native vegetation in our “Green Loop,” added roughly 5.9 acres of riparian habitat and 1,800 native trees to the Charleston Retention Basin, and designed our Bay View site like a bay’s edge, with large meadows, emergent and freshwater marsh, and one of the largest willow groves ever planted in the region. For more information on Google’s Urban Ecology program, see: <https://sustainability.google/projects/urbanecology/>

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

	Have climate-related risks and opportunities influenced your strategy in this area?	Description of influence
Products and services	Yes	<p>Since our founding, we've focused on providing the best user experience possible and taken great care to ensure the products and services we provide serve our customers. We value efficiency in everything we do, from creating products and building data centers to managing our supply chain and office space. We continually strive to make our processes more efficient and to reduce our impact on the environment, thereby helping our customers reduce their footprint, too. Google operates the cleanest cloud in the industry. Any regulation that imposes a price on carbon or regulates carbon emissions may incentivize customers to switch their technology infrastructure to take advantage of Google Cloud and Google Workspace products, which are enabling millions of businesses to shift their computing needs from self-managed data centers or colocation facilities to Google Cloud's highly efficient computing infrastructure, which is highly energy efficient, includes 100% renewable energy matching, and is carbon neutral. This could create additional demand for Google's existing products and/or services. The potential time horizon for this impact is predicted to be short-term. Some of the most substantial business decisions we've made to date that were influenced by climate change include: developing a goal to operate on carbon-free energy 24/7 by 2030, signing new renewable energy deals, regulatory advocacy, and ongoing data center efficiency efforts. As an example of a case study of one of the aforementioned strategic decisions, if new carbon regulations are implemented, Google is in a position to grow its products and services as, on average, a Google data center is twice as energy efficient as a typical enterprise data center. We achieved this through the use of increasingly efficient power supplies, cooling technology designed to meet local demands and geographical constraints, machine learning, and other innovations. As a result, we've helped customers evaluate their IT estates for their carbon impact and reduce their emissions through the use of our carbon-neutral services. We've released carbon free energy scores for our Google Cloud regions to help customers choose regions that would maximize the carbon-free energy that powers their application and reduce gross carbon emissions.</p>
Supply chain and/or value chain	Yes	<p>We have few direct emissions of greenhouse gases relative to our indirect emissions, therefore we do not expect our operations to be directly impacted by climate policy in the United States, nor do we expect to participate in any current or future compliance markets for carbon trading in the United States. Google does, however, face the risk of increased costs of energy if a price on carbon is applied through legislation such as cap and trade (or other mechanisms such as taxation). To the extent that a price on carbon is applied through legislation and passed on to us from a regulated entity, the cost of running our operations would likely increase. The potential time horizon for this impact is predicted to be short-term. Our strategy has been influenced in two ways: (1) we purchase renewable electricity for our operations, and (2) we design and operate our facilities to be as energy efficient as possible. Some of the most substantial business decisions we've made to date that were influenced by climate change include: developing a goal to operate on carbon-free energy 24/7 by 2030, signing new renewable energy deals, regulatory advocacy, and ongoing data center efficiency efforts. As an example of a case study, we work to reduce our exposure to the risk of a price on carbon applied through legislation by operating some of the most efficient data centers in the world, procuring carbon-free energy for our operations, and generating onsite renewable energy at several of our offices and at our data center in Belgium. As a result, in 2021, the average annual Power Usage Effectiveness (PUE) for our global fleet of data centers was 1.10, compared with the industry average of 1.57. From 2010 to 2021, we signed more than 60 agreements totaling more than 7 GW of renewable energy. In 2021, we set a goal to achieve net-zero emissions across all of our operations and value chain, including our consumer hardware products, by 2030. We aim to reduce the majority of our emissions (versus our 2019 baseline) before 2030, and plan to invest in nature-based and technology-based carbon removal solutions to neutralize our remaining emissions.</p>
Investment in R&D	Yes	<p>Some of the most substantial business decisions we've made to date that were influenced by climate change include: developing a goal to operate on carbon-free energy 24/7 by 2030, signing new renewable energy deals, regulatory advocacy, and ongoing data center efficiency efforts. Energy efficiency remains the most important component of our short-term strategy influenced by climate change. This includes our desire to maximize energy efficiency in order to increase the utilization of each kWh we purchase. For example, compared with five years ago, our data centers now deliver around five times as much computing power with the same amount of electrical power. We focus on reducing the energy we use by designing and building energy- and resource-efficient data centers and office buildings, as well as supporting energy efficient operations. The potential time horizon for this impact is predicted to be short-term. As an example of a case study, we believe that our scale, resources, and technological expertise can help the world meet its energy and resource needs in a responsible way that drives innovation and growth. That's why we strive to develop products that help drive carbon mitigation efforts and inform climate science. Seeing an opportunity to help raise awareness about the physical changes to the Earth's natural resources and climate, we developed Google Earth Engine (earthengine.google.com), a planetary scale platform for environmental data and analysis that brings together the world's satellite imagery and makes it available online. This tool has enabled tens of thousands of active users around the world to easily analyze over 52 petabytes of freely available geospatial information, resulting in a deeper understanding of the planet. The tool's computing is done inside our carbon-neutral, 100% renewable energy-matched data centers. We launched the Environmental Insights Explorer (EIE) in 2018 as a freely available tool that helps cities measure emission sources, identify strategies to reduce emissions, and track change over time. By the end of 2021, nearly 42,000 cities and regions worldwide were covered by the Environmental Insights Explorer.</p>
Operations	Yes	<p>We must cool our data centers to keep them in operation, and the amount of energy needed to cool them is related to the outside air temperature. If global temperatures increase, this will increase the amount of energy required to cool our data centers and increase the cost of running our operations. Given that climate change is expected to increase average temperatures globally and we have facilities and operations around the world, this is a risk we face at all of our facilities globally. In particular, this may impact our data centers located in warm climates, such as our data center in Singapore. In general, we expect that our cooling costs will go up if there were an 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 noticeable rise in our cooling costs, assuming we were not further able to improve our energy efficiency. This would have a low-medium negative financial impact. The potential time horizon for this impact is predicted to be medium-term. In addition, the potential increase in electricity prices due to the physical impacts of climate change and any resulting regulations may increase our push to source long-term contracts for renewable electricity to avoid exposure to electricity price volatility and/or increases. Some of the most substantial business decisions we've made to date that were influenced by climate change include: developing a goal to operate on carbon-free energy 24/7 by 2030, signing new renewable energy deals, regulatory advocacy, and ongoing data center efficiency efforts. As an example of a case study, we mitigate potential increases in long-term energy prices and work towards our goal of operating on carbon-free energy on a 24/7 basis by 2030 by looking for opportunities to procure renewable energy via long-term contracts with stable prices, such as power purchase agreements (PPAs). As a result, by the end of 2021, we had signed more than 60 power purchase agreements for more than 7 GW of renewable energy that is new to the grid.</p>

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

	Financial planning elements that have been influenced	Description of influence
Row 1	Revenues Indirect costs Capital expenditures Capital allocation Assets Liabilities	<p>Capital expenditures: The availability of our products and services depends on the continuing operation of our information technology and communications systems. We invest in land and buildings for data centers and offices, and information technology assets, which includes servers and network equipment, to support the long-term growth of our business. Our systems are vulnerable to damage, interference or interruption from natural disasters, the effects of climate change (such as sea level rise, drought, flooding, wildfires, and increased storm severity), or other factors. The potential time horizon for this impact is predicted to be medium-term. Our headquarters are located in Mountain View, California. We also own and lease office and building space in the surrounding areas near our headquarters. In addition, we own and lease office/building space and research and development sites around the world, primarily in North America, Europe, South America, and Asia. We own and operate data centers in the U.S., Europe, South America, and Asia. As an example of a case study, in 2017, we conducted an assessment of Google's exposure to climate risk in the near-term (2020-2025), mid-term (2050), and long-term (2100). This included a global assessment of the impact of flooding on our real estate operations. Based on RCP 4.5 and 8.5, the San Francisco Bay Area is projected to experience sea level rise between 18.5-26.0 inches by the end of the century. Even though the location of Google's Bay Area headquarters is not projected to experience the highest level of sea level rise when compared to the other Google sites assessed as part of this study, the location of the buildings in Mountain View, Sunnyvale, and Palo Alto and the importance of these sites as Google's global headquarters places those facilities at a particularly high risk when mapped against anticipated sea level rise. Many of Google's buildings in these locations are located in the current 100-year floodplain and, therefore, are at risk to impacts from coastal flooding in the present day. Those risks will only be further exacerbated by sea level rise throughout the century. Since flooding and extreme heat have emerged as critical climate risks that could have a significant impact on physical assets and occupants, they have been considered as part of the overall development strategy for Google's expanding footprint. In an effort to address this risk, Google's Urban Ecology Program focuses on designing healthy, biodiverse ecosystems that can endure and evolve with a changing climate. As a result, Google has planted 1.4 acres of native vegetation in our "Green Loop," added roughly 5.9 acres of riparian habitat and 1,800 native trees to the Charleston Retention Basin, and designed our Bay View site like a bay's edge, with large meadows, emergent and freshwater marsh, and one of the largest willow groves ever planted in the region. For more information on Google's Urban Ecology program, see: https://sustainability.google/projects/urban-ecology/ In 2020, Google conducted an updated climate risk assessment, building on the previous risk assessment that was conducted in 2017. This included climate scenario analysis, referencing RCP 4.5 and 8.5, and an assessment of the impact of flooding, water stress, extreme heat, and wildfires on 26 priority office sites and 23 data center locations. The key result of this scenario analysis was that increased exposure to extreme heat and flooding is likely to impact many of our global offices and data centers as early as 2030. The 2020 climate risk assessment continues to inform Google's Ecology Program and efforts. Additionally, in 2015, Google developed a set of Principles of Climate Resilience, which support our definition of climate risk and resilience. From there, we created a framework that prioritizes impacts to people (including communities, users, and Googlers) so that it represents the different aspects of climate resilience within Google, as well as the internal and external actors who either influence or are influenced by Google's climate resilience decisions. For more information, see: https://ssir.org/articles/entry/connecting_climate_resilience_to_the_bottom_line Indirect costs: Running our business requires us to use a lot of electricity to power our data centers, offices, and other infrastructure. Google has 23 data center locations across four continents. In 2021, our total energy consumption was 18,571,659 MWh. We must cool our data centers to keep them in operation, and the amount of energy needed to cool them is related to the outside air temperature. If global temperatures increase, this will increase the amount of energy required to cool our data centers and increase the cost of running our operations. Given that climate change is expected to increase average temperatures globally and we have facilities and operations around the world, this is a risk we face at all of our facilities globally. In particular, this may impact our data centers located in warm climates, such as our data center in Singapore. The potential time horizon for this impact is predicted to be medium-term. In general, we expect that our cooling costs would go up if there were an 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 noticeable rise in our cooling costs, assuming we were not further able to improve our energy efficiency. This would have a low-medium negative financial impact.</p>

C3.5

(C3.5) In your organization's financial accounting, do you identify spending/revenue that is aligned with your organization's transition to a 1.5°C world?

No, but we plan to in the next two years

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

2021

Target coverage

Company-wide

Scope(s)

Scope 1

Scope 2

Scope 3

Scope 2 accounting method

Market-based

Scope 3 category(ies)

Category 1: Purchased goods and services

Category 2: Capital goods

Category 3: Fuel-and-energy-related activities (not included in Scopes 1 or 2)

Category 4: Upstream transportation and distribution

Category 5: Waste generated in operations

Category 6: Business travel
Category 7: Employee commuting
Category 8: Upstream leased assets
Category 9: Downstream transportation and distribution
Category 10: Processing of sold products
Category 11: Use of sold products
Category 12: End-of-life treatment of sold products
Category 13: Downstream leased assets
Category 14: Franchises
Category 15: Investments
Other (upstream)
Other (downstream)

Base year

2019

Base year Scope 1 emissions covered by target (metric tons CO2e)

66686

Base year Scope 2 emissions covered by target (metric tons CO2e)

794267

Base year Scope 3 emissions covered by target (metric tons CO2e)

11669000

Total base year emissions covered by target in all selected Scopes (metric tons CO2e)

12529953

Base year Scope 1 emissions covered by target as % of total base year emissions in Scope 1

100

Base year Scope 2 emissions covered by target as % of total base year emissions in Scope 2

100

Base year Scope 3 emissions covered by target as % of total base year emissions in Scope 3 (in all Scope 3 categories)

100

Base year emissions covered by target in all selected Scopes as % of total base year emissions in all selected Scopes

100

Target year

2030

Targeted reduction from base year (%)

50

Total emissions in target year covered by target in all selected Scopes (metric tons CO2e) [auto-calculated]

6264976.5

Scope 1 emissions in reporting year covered by target (metric tons CO2e)

45073

Scope 2 emissions in reporting year covered by target (metric tons CO2e)

1823132

Scope 3 emissions in reporting year covered by target (metric tons CO2e)

9503000

Total emissions in reporting year covered by target in all selected scopes (metric tons CO2e)

11371205

% of target achieved relative to base year [auto-calculated]

18.4956479884641

Target status in reporting year

New

Is this a science-based target?

Yes, we consider this a science-based target, and we have committed to seek validation of this target by the Science Based Targets initiative in the next two years

Target ambition

1.5°C aligned

Please explain target coverage and identify any exclusions

In 2021, we set a goal to achieve net-zero emissions across all of our operations and value chain, including our consumer hardware products, by 2030. We aim to reduce the majority of our emissions (versus our 2019 baseline) before 2030, and plan to invest in nature-based and technology-based carbon removal solutions to neutralize our remaining emissions.

Plan for achieving target, and progress made to the end of the reporting year

We aim to reduce the majority of our emissions (versus our 2019 baseline) before 2030, and plan to invest in nature-based and technology-based carbon removal solutions to neutralize our remaining emissions.

List the emissions reduction initiatives which contributed most to achieving this target

<Not Applicable>

Target reference number

Abs 2

Year target was set

2020

Target coverage

Company-wide

Scope(s)Scope 1
Scope 2
Scope 3**Scope 2 accounting method**

Market-based

Scope 3 category(ies)Category 6: Business travel
Category 7: Employee commuting**Base year**

2020

Base year Scope 1 emissions covered by target (metric tons CO2e)

38694

Base year Scope 2 emissions covered by target (metric tons CO2e)

911415

Base year Scope 3 emissions covered by target (metric tons CO2e)

213000

Total base year emissions covered by target in all selected Scopes (metric tons CO2e)

1163109

Base year Scope 1 emissions covered by target as % of total base year emissions in Scope 1

100

Base year Scope 2 emissions covered by target as % of total base year emissions in Scope 2

100

Base year Scope 3 emissions covered by target as % of total base year emissions in Scope 3 (in all Scope 3 categories)

2.27

Base year emissions covered by target in all selected Scopes as % of total base year emissions in all selected Scopes

100

Target year

2021

Targeted reduction from base year (%)

100

Total emissions in target year covered by target in all selected Scopes (metric tons CO2e) [auto-calculated]

0

Scope 1 emissions in reporting year covered by target (metric tons CO2e)

45073

Scope 2 emissions in reporting year covered by target (metric tons CO2e)

1823132

Scope 3 emissions in reporting year covered by target (metric tons CO2e)

136000

Total emissions in reporting year covered by target in all selected scopes (metric tons CO2e)

2004205

% of target achieved relative to base year [auto-calculated]

-72.3144606395445

Target status in reporting year

Achieved

Is this a science-based target?

No, but we are reporting another target that is science-based

Target ambition

<Not Applicable>

Please explain target coverage and identify any exclusions

Every year, we have a goal of being carbon neutral for our operations. As of December 31, 2021, we reached carbon neutrality for 100% of our FY2021 operational emissions, which represent Scope 1 + Scope 2 (market-based) + Scope 3 (business travel, candidate travel, and employee commuting). Abs2 covers Scope 1 + Scope 2 (market-based) + Scope 3 (business travel, candidate travel, and employee commuting). We committed to being carbon neutral for our operations in 2007 and we have achieved this goal each year since then. We maintain our commitment to carbon neutrality of our operational footprint first through energy efficiency, second, by signing long-term contracts for renewable energy directly from our utility providers and from renewable energy facilities in the same grid regions as our data centers, and lastly, by investing in high-quality carbon offset projects. In 2021, we achieved 15 consecutive years of carbon neutrality. We understand that CDP does not acknowledge carbon credits 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.

Plan for achieving target, and progress made to the end of the reporting year

<Not Applicable>

List the emissions reduction initiatives which contributed most to achieving this target

The emissions reduction initiatives which contributed most to achieving our carbon neutrality target include: driving energy efficiency, procuring renewable energy, and

purchasing high-quality carbon credits for all the emissions that we can't yet eliminate, like employee travel and commuting. An example of our efforts to drive energy efficiency comes from our data centers. Our long-standing data center efficiency efforts are more important than ever because our data centers represent the vast majority of our electricity use. To reduce energy use, we strive to build the world's most energy-efficient computing network by squeezing more out of every watt of power we consume. First, we outfit each data center with high-performance servers that we've custom-designed to use as little energy as possible. We improve facility energy use by installing smart temperature and lighting controls and redesigning how power is distributed to reduce energy loss. We employ advanced cooling techniques, relying primarily on energy-efficient evaporative cooling, and use non-potable water at some sites. At some sites, we also reuse waste heat generated by our servers to heat our data center office spaces and other on-site facilities. Finally, we're applying machine learning to drive energy efficiency even further and automatically optimize cooling.

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
Net-zero target(s)

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: energy carrier

Electricity

Target type: activity

Consumption

Target type: energy source

Renewable energy source(s) only

Base year

2015

Consumption or production of selected energy carrier in base year (MWh)

5221476

% share of low-carbon or renewable energy in base year

48

Target year

2040

% share of low-carbon or renewable energy in target year

100

% share of low-carbon or renewable energy in reporting year

100

% of target achieved relative to base year [auto-calculated]

100

Target status in reporting year

Achieved

Is this target part of an emissions target?

No

Is this target part of an overarching initiative?

RE100

Please explain target coverage and identify any exclusions

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 2021, we achieved it for the fifth 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. From 2010 to 2021, we've signed more than 60 agreements totaling more than 7 gigawatts of renewable energy. Reaching our 100% renewable purchasing goal means that Google buys on an annual basis the same amount of megawatt-hours (MWh) of renewable energy—both the physical energy and its corresponding renewable energy certificates (RECs)—as the amount of MWh of electricity that we consume for our operations around the world. Where possible, we buy this energy directly from our utility providers and from green energy facilities in the same grid regions as our data centers. In 2021, our operational Scope 1 and Scope 2 emissions were 72% lower due to our renewable energy procurement. Matching 100% renewable energy is just the beginning. We're building new data centers and offices, and as demand for Google products grows, so does our electricity load. We need to be constantly adding renewables to our portfolio to keep up. So we'll keep signing contracts to buy more renewable energy. And in those regions where we can't yet buy renewables, we'll keep working on ways to help open the market. In 2015, Google joined the RE100 initiative—an initiative led by the Climate Group and CDP—as well as the We Mean Business coalition, committing to procure 100% of our electricity from renewable sources. In 2018, we announced our ambition to power all of our data centers with carbon-free energy on a 24/7 basis (every hour of every day). In 2020, we committed to becoming the first major company to operate on carbon-free energy 24/7—everywhere, at all times—by 2030.

Plan for achieving target, and progress made to the end of the reporting year

<Not Applicable>

List the actions which contributed most to achieving this target

We've worked hard to address our climate impacts. It began in 2007 when we became the first company to go carbon neutral for our operations -- compensating for as much carbon as our operations generated. In the process, we worked to make Google data centers some of the most energy efficient in the world. In 2017, we became the first company of our size to match 100% of our annual electricity consumption with renewable energy. But we're not stopping there. Our 100% renewable match was only an interim solution, and the urgency of the climate challenge demands a bigger and bolder vision. That's why we've announced a first-of-its-kind target to achieve 24/7 Carbon-Free Energy by 2030. But we can't do it alone. That's why in 2021, we launched a 24/7 Carbon-Free Energy Compact with Sustainable Energy for All — an international organization working in partnership with the United Nations — to bring together an array of stakeholders on a collective mission to transform global electricity grids to “absolute zero” by advancing 24/7 Carbon-free Energy. We're carving a path forward to fully decarbonize our electricity supply and operate on carbon-free energy entirely. Clean energy every hour, every day, everywhere. Read more about how we're taking on this challenge in our white paper <https://www.gstatic.com/gumdrop/sustainability/247-carbon-free-energy.pdf>

Target reference number

Low 2

Year target was set

2020

Target coverage

Company-wide

Target type: energy carrier

Electricity

Target type: activity

Consumption

Target type: energy source

Low-carbon energy source(s)

Base year

2019

Consumption or production of selected energy carrier in base year (MWh)

12237198

% share of low-carbon or renewable energy in base year

61

Target year

2030

% share of low-carbon or renewable energy in target year

100

% share of low-carbon or renewable energy in reporting year

66

% of target achieved relative to base year [auto-calculated]

12.8205128205128

Target status in reporting year

Underway

Is this target part of an emissions target?

No

Is this target part of an overarching initiative?

No, it's not part of an overarching initiative

Please explain target coverage and identify any exclusions

Low2 represents our commitment to to run our business on carbon-free energy everywhere, at all times by 2030. In 2018, we announced a long-term ambition to sourcing carbon-free energy for our operations 24/7. This means that we'll evolve from matching our annual energy consumption with renewable energy to sourcing carbon-free energy around the clock. In 2020, building on what we'd learned and due to the transformation underway in the global energy system, we set a deadline for our carbon-free energy goal: By 2030, Google intends to run on carbon-free energy 24/7—everywhere, at all times. Starting with our data centers, and then moving on to our office campuses, we aim to bring clean energy to Google's operations in a way that eliminates our emissions and accelerates a global energy transition. This is our biggest sustainability moonshot yet, with enormous practical and technical complexity. We're the first major company to commit to sourcing 24/7 carbon-free energy for our operations, and we aim to be the first to achieve it. In 2021, we matched 100% of our annual global electricity consumption with renewable energy for the fifth consecutive year, but on an hourly basis, only 66% of our data center electricity use was matched with regional carbon-free sources.

Plan for achieving target, and progress made to the end of the reporting year

To achieve 24/7 carbon-free energy in Google's operations, we'll need to 1) advance new approaches for procuring clean energy, 2) drive progress in next-generation technologies, and 3) work with partners to advocate for smart public policy. As we did with 100% renewable energy, we'll strive to move toward our goal in a way that creates opportunities for others and accelerates a global energy transition. For more information on our plan to achieve 24/7 Carbon-Free Energy by 2030, see our white paper <https://www.gstatic.com/gumdrop/sustainability/247-carbon-free-energy.pdf> As of 2021 we are operating at over 66% carbon-free energy across our data centers, down 1% from 2020, but up 5% from 2019. We continue to advance progress toward this goal by developing new hardware and software technologies, scaling new transaction models, and creating initiatives, like the 24/7 CFE compact, to align advocacy efforts across the globe for stronger clean energy policies.

List the actions which contributed most to achieving this target

<Not Applicable>

(C4.2c) Provide details of your net-zero target(s).

Target reference number

NZ1

Target coverage

Company-wide

Absolute/intensity emission target(s) linked to this net-zero target

Abs1

Target year for achieving net zero

2030

Is this a science-based target?

Yes, we consider this a science-based target, and we have committed to seek validation of this target by the Science Based Targets initiative in the next 2 years

Please explain target coverage and identify any exclusions

At Google, our goal is to achieve net-zero emissions across all of our operations and value chain, including our consumer hardware products, by 2030. We aim to reduce the majority of our emissions (versus our 2019 baseline) before 2030, and plan to invest in nature-based and technology-based carbon removal solutions to neutralize our remaining emissions.

Do you intend to neutralize any unabated emissions with permanent carbon removals at the target year?

Yes

Planned milestones and/or near-term investments for neutralization at target year

We'll invest in emerging companies developing technology-based and nature-based carbon removal solutions, like our recent \$200 million commitment through Frontier.

Planned actions to mitigate emissions beyond your value chain (optional)

As part of our third decade of climate action, in 2020 we also announced a goal to: Enable 5 gigawatts of new carbon-free energy through investments in our key manufacturing regions; Help more than 500 cities and local governments reduce an aggregate of 1 gigaton of carbon emissions annually; and Help 1 billion people make more sustainable choices by the end of 2022. In 2021, we shared several new ways people can use Google's products to make sustainable choices, including new features to book flights or purchase appliances that have lower carbon footprints, eco-friendly routing in Google Maps, and a new program, called Nest Renew, to support clean energy from home.

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*	6	0
Implementation commenced*	2	45
Implemented*	22	7369
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)

5526

Scope(s) or Scope 3 category(ies) where emissions savings occur

Scope 1

Scope 2 (market-based)

Voluntary/Mandatory

Voluntary

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

3500000

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

24055000

Payback period

4-10 years

Estimated lifetime of the initiative

Ongoing

Comment

Implementation of ongoing energy efficiency improvements in our San Francisco Bay Area offices. In 2021, 10 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)

492

Scope(s) or Scope 3 category(ies) where emissions savings occur

Scope 2 (market-based)

Voluntary/Mandatory

Voluntary

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

155089

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

19492

Payback period

<1 year

Estimated lifetime of the initiative

Ongoing

Comment

Implementation of initiatives to improve energy management at four of our offices in Kirkland, Washington in 2021. 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)

268

Scope(s) or Scope 3 category(ies) where emissions savings occur

Scope 2 (market-based)

Voluntary/Mandatory

Voluntary

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

55559

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

6983

Payback period

<1 year

Estimated lifetime of the initiative

Ongoing

Comment

Implementation of initiatives to improve energy management at two of our offices in Krakow, Poland in 2021. 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)

881

Scope(s) or Scope 3 category(ies) where emissions savings occur

Scope 3 category 7: Employee commuting

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 2021, our Google shuttle buses in the Bay Area produced savings of approximately 881 tCO2e emissions. Note: This program was impacted due to the global pandemic in 2021. 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)

202

Scope(s) or Scope 3 category(ies) where emissions savings occur

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 2021. Google has many emissions reduction initiatives and we've chosen only a small subset to detail out here as examples of the activities we've implemented in the reporting year.

C4.3c

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

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

C4.5

(C4.5) Do you classify any of your existing goods and/or services as low-carbon products?

Yes

C4.5a

(C4.5a) Provide details of your products and/or services that you classify as low-carbon products.

Level of aggregation

Product or service

Taxonomy used to classify product(s) or service(s) as low-carbon

No taxonomy used to classify product(s) or service(s) as low carbon

Type of product(s) or service(s)

Other	Other, please specify (Eco-friendly routing in Google Maps)
-------	--

Description of product(s) or service(s)

In 2020, we committed to help 1 billion people make more sustainable choices through our core products by 2022. We've shared several new ways people can use Google products—such as Google Flights, Google Maps, Google Search, and Google Shopping—to make more sustainable choices. For more details, see <https://blog.google/outreach-initiatives/sustainability/sustainability-2021/>. Whether someone is using Google at home or as part of an organization running Google Cloud or Google Workspace, all products in our Cloud are carbon neutral. For more details, see <https://cloud.google.com/sustainability>. Additionally, we're developing tools to help everyone reduce their environmental impact, understand the planet, and take sustainable action. For more details, see <https://sustainability.google/technology/>. The following is an example of how we're empowering everyone with technology. Google Maps assists people as they navigate, explore, and get things done in the world. Eco-friendly routing in Google Maps is a new tool, first launched in the U.S. in 2021, that helps drivers make more sustainable choices when getting from point A to point B. Eco-friendly routing uses a new routing model that enables people to navigate to their destination as quickly as possible, while also optimizing for lower fuel consumption. This reduces CO2 emissions, saves users money on fuel, and even helps reduce air pollution—with nearly no trade-off in terms of travel time.

Have you estimated the avoided emissions of this low-carbon product(s) or service(s)

Yes

Methodology used to calculate avoided emissions

Other, please specify (For more details about how we calculated the emissions impact of eco-friendly routing, please see our white paper, Google Maps Eco-Friendly Routing (<https://www.gstatic.com/gumdrop/sustainability/google-maps-eco-friendly-routing.pdf>))

Life cycle stage(s) covered for the low-carbon product(s) or services(s)

Use stage

Functional unit used

Metric tonnes of carbon dioxide emissions

Reference product/service or baseline scenario used

We analyzed fuel consumption for all routes driven on Google Maps, using a representative set of vehicle types. Then, using AI and Google Maps' record of available alternative routes at the relevant times, we identified and calculated the fuel usage of each of these viable alternative routes.

Life cycle stage(s) covered for the reference product/service or baseline scenario

Use stage

Estimated avoided emissions (metric tons CO2e per functional unit) compared to reference product/service or baseline scenario

500000

Explain your calculation of avoided emissions, including any assumptions

Google, with the help of the U.S. Department of Energy's National Renewable Energy Laboratory's (NREL) RouteE technology, started by analyzing fuel consumption for all routes driven on Google Maps during the last year using a representative set of vehicle types. Then, using AI and Google Maps' record of available alternative routes at the relevant times, we identified and calculated the fuel usage of each of these viable alternative routes. This enabled us to pinpoint the most fuel-efficient route for any given journey made last year. Next, we removed any fuel-efficient alternative that noticeably increased drive time or did not provide meaningful fuel savings. And finally, to achieve the resulting one million metric tons of CO2 calculation, we tallied the total fuel usage of the more fuel-efficient routes, subtracting this number from the fuel usage that actually occurred, and input this value into the EPA's Greenhouse Gas Equivalencies Calculator. Eco-friendly routes have already rolled out in the U.S. and Canada—and people have used them to travel approximately 86 billion miles, helping save an estimated half million metric tons of carbon emissions, the equivalent of taking 100,000 cars off the road. Note: This figure covers estimated emissions avoided after eco-friendly routing was launched, from October 2021 through April 2022. Explanation of revenue %: We are unable to provide precise estimates for this figure, so we have put 1% for the 'revenue generated from low carbon product(s) or service(s) as % of total revenue in the reporting year'.

Revenue generated from low-carbon product(s) or service(s) as % of total revenue in the reporting year

1

C5. Emissions methodology

C5.1

(C5.1) Is this your first year of reporting emissions data to CDP?

No

C5.1a

(C5.1a) Has your organization undergone any structural changes in the reporting year, or are any previous structural changes being accounted for in this disclosure of emissions data?

Row 1

Has there been a structural change?

Yes, an acquisition

Name of organization(s) acquired, divested from, or merged with

Fitbit

Details of structural change(s), including completion dates

In January 2021, we closed the acquisition of Fitbit, a leading wearables brand. See Note 8 of the Notes to Consolidated Financial Statements included in Item 8 of this Annual Report on Form 10-K for further information https://abc.xyz/investor/static/pdf/20220202_alphabet_10K.pdf

C5.1b

(C5.1b) Has your emissions accounting methodology, boundary, and/or reporting year definition changed in the reporting year?

	Change(s) in methodology, boundary, and/or reporting year definition?	Details of methodology, boundary, and/or reporting year definition change(s)
Row 1	Yes, a change in boundary	Yes, a reporting boundary change. In January 2021, we closed the acquisition of Fitbit, a leading wearables brand. The emissions from the Fitbit organization have been added to our reporting boundary.

C5.1c

(C5.1c) Have your organization's base year emissions been recalculated as result of the changes or errors reported in C5.1a and C5.1b?

	Base year recalculation	Base year emissions recalculation policy, including significance threshold
Row 1	No, because the impact does not meet our significance threshold	The impact does not meet our significance threshold.

C5.2

(C5.2) Provide your base year and base year emissions.

Scope 1

Base year start

January 1 2019

Base year end

December 31 2019

Base year emissions (metric tons CO2e)

66686

Comment

Scope 2 (location-based)

Base year start

January 1 2019

Base year end

December 31 2019

Base year emissions (metric tons CO2e)

5116949

Comment

Scope 2 (market-based)

Base year start

January 1 2019

Base year end

December 31 2019

Base year emissions (metric tons CO2e)

794267

Comment

Scope 3 category 1: Purchased goods and services

Base year start

January 1 2019

Base year end

December 31 2019

Base year emissions (metric tons CO2e)

0

Comment

Scope 3 category 2: Capital goods

Base year start

January 1 2019

Base year end

December 31 2019

Base year emissions (metric tons CO2e)

2158000

Comment

Scope 3 category 3: Fuel-and-energy-related activities (not included in Scope 1 or 2)

Base year start

January 1 2019

Base year end

December 31 2019

Base year emissions (metric tons CO2e)

0

Comment

Scope 3 category 4: Upstream transportation and distribution

Base year start

January 1 2019

Base year end

December 31 2019

Base year emissions (metric tons CO2e)

460000

Comment

Scope 3 category 5: Waste generated in operations

Base year start

January 1 2019

Base year end

December 31 2019

Base year emissions (metric tons CO2e)

0

Comment

Scope 3 category 6: Business travel

Base year start

January 1 2019

Base year end

December 31 2019

Base year emissions (metric tons CO2e)

369000

Comment

Scope 3 category 7: Employee commuting

Base year start

January 1 2019

Base year end

December 31 2019

Base year emissions (metric tons CO2e)

173000

Comment

Scope 3 category 8: Upstream leased assets

Base year start

January 1 2019

Base year end

December 31 2019

Base year emissions (metric tons CO2e)

0

Comment

Scope 3 category 9: Downstream transportation and distribution

Base year start

January 1 2019

Base year end

December 31 2019

Base year emissions (metric tons CO2e)

0

Comment

Scope 3 category 10: Processing of sold products

Base year start

January 1 2019

Base year end

December 31 2019

Base year emissions (metric tons CO2e)

0

Comment

Scope 3 category 11: Use of sold products

Base year start

January 1 2019

Base year end

December 31 2019

Base year emissions (metric tons CO2e)

0

Comment

Scope 3 category 12: End of life treatment of sold products

Base year start

January 1 2019

Base year end

December 31 2019

Base year emissions (metric tons CO2e)

0

Comment

Scope 3 category 13: Downstream leased assets

Base year start

January 1 2019

Base year end

December 31 2019

Base year emissions (metric tons CO2e)

0

Comment

Scope 3 category 14: Franchises

Base year start

January 1 2019

Base year end

December 31 2019

Base year emissions (metric tons CO2e)

0

Comment

Scope 3 category 15: Investments

Base year start

January 1 2019

Base year end

December 31 2019

Base year emissions (metric tons CO2e)

0

Comment

Scope 3: Other (upstream)

Base year start

January 1 2019

Base year end

December 31 2019

Base year emissions (metric tons CO2e)

8509000

Comment

Scope 3: Other (downstream)

Base year start

January 1 2019

Base year end

December 31 2019

Base year emissions (metric tons CO2e)

0

Comment

C5.3

(C5.3) 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)

45073

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

6576239

Scope 2, market-based (if applicable)

1823132

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

Emissions in reporting year (metric tons CO2e)

0

Emissions calculation methodology

Hybrid method

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

Please explain

We estimate GHG emissions from manufacturing Alphabet consumer devices, and include the estimates in the totals reported in "Capital Goods" and "Other (upstream)", along with the descriptions of the methodologies included in the sections below. We factor our food program into this category. We conduct the estimate using procurement data from Bay Area cafes and microkitchens as a proxy for our global operations. We use LCA emission factors sourced from publicly available datasets recommended by WRI and combine them with annual Bay Area procurement volumes. We then extrapolate to our global operations using seated headcount as a scaling factor. The quality of the estimate is likely moderate, as supplier-specific LCA figures were not collected and regional differences in procurement were not captured in the assessment. Note: This program was impacted due to the global pandemic in 2021. We are not breaking this data out specifically for business reasons. The total is included in the "Other (upstream)" category below.

Capital goods

Evaluation status

Relevant, calculated

Emissions in reporting year (metric tons CO2e)

1676000

Emissions calculation methodology

Hybrid method

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

79

Please explain

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, component suppliers, and fabless suppliers through the CDP Supply Chain Program. These suppliers represent our key "Tier 1" hardware suppliers with whom we have a direct relationship. GHG emissions were estimated by facility- and company-level emissions allocated to Alphabet, as reported by suppliers or calculated based on GHG intensity and Alphabet's spend data, to collectively represent 100% of the spend. Data gaps were estimated with industry-average GHG intensities by sector and spend data. 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.

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

Evaluation status

Not relevant, calculated

Emissions in reporting year (metric tons CO2e)

0

Emissions calculation methodology

Average data method

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

Emissions in reporting year (metric tons CO2e)

485000

Emissions calculation methodology

Fuel-based method
Distance-based method
Site-specific method

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

89

Please explain

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.

Waste generated in operations

Evaluation status

Not relevant, explanation provided

Emissions in reporting year (metric tons 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

Emissions in reporting year (metric tons CO2e)

26000

Emissions calculation methodology

Fuel-based method
Distance-based method

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

Please explain

We estimated business travel and candidate travel using data that includes the distance of each trip and the seating class for air travel and rail travel. We also included data from rental car companies on total fuel consumption from all rental car reservations. Given that our internal data collection for business travel is robust, the quality of the resulting emissions estimate is also likely high. Note: This program was impacted due to the global pandemic in 2021.

Employee commuting

Evaluation status

Relevant, calculated

Emissions in reporting year (metric tons CO2e)

110000

Emissions calculation methodology

Average data method
Distance-based method

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

Please explain

We estimated employee commuting using internal data on employees and applying the average one-way commuting distance and average passenger vehicle fuel economy from U.S. government data sources. We excluded trips made by our shuttles, vanpools, and self-powered commuters (walking, biking, etc.) as these commuting emissions were captured in Scope 1 emissions or are 0. We also excluded commuters using electric vehicles within this calculation (as EV charging on Google campuses is part of our Scope 2). This estimate is based on the best available data at the time of our calculation including the use of a US-average commute estimate. Note: This program was impacted due to the global pandemic in 2021. This category also reflects emissions associated with employee teleworking (otherwise known as "work-from-home") during the global pandemic in 2021.

Upstream leased assets

Evaluation status

Not relevant, explanation provided

Emissions in reporting year (metric tons 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

Not evaluated

Emissions in reporting year (metric tons 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

To estimate outbound transportation and distribution (paid for by Alphabet) 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 emissions in the "Upstream transportation and distribution" category

Processing of sold products

Evaluation status

Not relevant, explanation provided

Emissions in reporting year (metric tons 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

Emissions in reporting year (metric tons CO2e)

0

Emissions calculation methodology

Methodology for direct use phase emissions, please specify (See the "Please explain" section for more details)

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

Please explain

The GHG emissions from use of sold products were calculated for all of Google's flagship products sold in 2021. 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. Note: In 2021, emissions from Fitbit were added to our reporting boundary. 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

Emissions in reporting year (metric tons CO2e)

0

Emissions calculation methodology

Average data method

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

Please explain

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.

Downstream leased assets

Evaluation status

Not relevant, explanation provided

Emissions in reporting year (metric tons 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

Emissions in reporting year (metric tons 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

Emissions in reporting year (metric tons 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

Emissions in reporting year (metric tons CO2e)

7206000

Emissions calculation methodology

Hybrid method

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

4

Please explain

GHG emissions beyond our Tier 1 hardware manufacturing suppliers are included in this category. The estimate was determined by applying a multiplier that is based on Alphabet's previous hardware Scope 3 emissions using Economic Input-Output Life Cycle Assessment method and that is consistent with Scope 3 data reported by our suppliers through the CDP Supply Chain Program. For fabless suppliers, upstream Scope 3 emissions data allocated to Google were used when reported. Although these figures are estimated with a high degree of uncertainty, this method is a common approach that aligns with emissions reporting standards. 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.

Other (downstream)

Evaluation status

Not relevant, explanation provided

Emissions in reporting year (metric tons 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	3797	

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

0.00000725

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

1868205

Metric denominator

unit total revenue

Metric denominator: Unit total

257637000000

Scope 2 figure used

Market-based

% change from previous year

39.18

Direction of change

Increased

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 2021, our wind and solar deals, together with the RE that comes from the grid, produced enough renewable energy to match 100% of the electricity consumption of our offices, data centers, and networking infrastructure for the fifth consecutive year. In addition, we continue to deliver more and better services and products to more users using less

energy and fewer emissions. We also operate our data centers and offices more efficiently (See: <https://www.google.com/about/datacenters/efficiency/>). Despite an increase in our total procurement of renewable energy in 2021 to match 100% of the electricity consumption of our operations, we have a few data center locations (i.e. Singapore) on grids where we are not currently able to source large volumes of renewable energy or where we are not currently able to source renewable energy. Our operations at some of these sites grew in 2020, which resulted in an increase in our total market-based Scope 2 emissions. However, due to increases in our unit total revenue and our emissions in 2021, there was an increase in the amount of combined Scope 1 and 2 emissions per unit of total revenue. This revenue intensity figure was calculated by taking our combined 2021 Scope 1 and market-based Scope 2 emissions divided by our total revenue for fiscal year 2021. Because of our emissions-reduction efforts, our carbon intensity has steadily decreased even as our company has grown and our energy use has correspondingly increased. Since 2011, our carbon intensity per unit of revenue decreased by 81%.

Intensity figure

12.87

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

1868205

Metric denominator

full time equivalent (FTE) employee

Metric denominator: Unit total

145159

Scope 2 figure used

Market-based

% change from previous year

71.83

Direction of change

Increased

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 2021, our wind and solar deals, together with the RE that comes from the grid, produced enough renewable energy to match 100% of the electricity consumption of our offices, data centers, and networking infrastructure for the fifth consecutive year. In addition, we continue to deliver more and better services and products to more users using less energy and fewer emissions. We also operate our data centers and offices more efficiently (See: <https://www.google.com/about/datacenters/efficiency/>). Despite an increase in our total procurement of renewable energy in 2021 to match 100% of the electricity consumption of our operations, we have a few data center locations (i.e. Singapore) on grids where we are not currently able to source large volumes of renewable energy or where we are not currently able to source renewable energy. Our operations at some of these sites grew in 2021, which resulted in a slight increase in our total market-based Scope 2 emissions. Even though there was an increase in the number of employees in 2021, an increase in the amount of combined Scope 1 and 2 emissions per employee occurred. This FTE employee intensity figure was calculated by taking our combined 2021 Scope 1 and market-based Scope 2 emissions divided by our average 2021 headcount. Because of our emissions-reduction efforts, our carbon intensity has steadily decreased even as our company has grown and our energy use has correspondingly increased. Since 2011, our carbon intensity per FTE employee decreased by 75%.

Intensity figure

0.1006

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

1868205

Metric denominator

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

Metric denominator: Unit total

18571659

Scope 2 figure used

Market-based

% change from previous year

63.57

Direction of change

Increased

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 2021, our wind and solar deals, together with the RE that comes from the grid, produced enough renewable energy to match 100% of the electricity consumption of our offices, data centers, and networking infrastructure for the fifth consecutive year. In addition, we continue to deliver more and better services and products to more users using less energy and fewer emissions. We also operate our data centers and offices more efficiently (See: <https://www.google.com/about/datacenters/efficiency/>). We calculated the FY2021 intensity figure by taking the 2021 Scope 1 and market-based Scope 2 emissions total divided by total energy consumption (MWh) in 2021.

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	45073	IPCC Fourth Assessment Report (AR4 - 100 year) <i>Scope 1 emissions reported as CO2 includes three greenhouse gases: CO2, CH4, and N2O. Carbon dioxide, methane, and nitrous oxide emissions are included within our gross global emissions. Due to the nature of our emissions calculation and aggregation processes, it is not feasible to disclose the breakdown of total emissions for each greenhouse gas. Therefore, the emissions are aggregated and reported in carbon dioxide equivalent (CO2e) collectively in the CO2 line in C7.1a.</i>

C7.2

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

Country/Region	Scope 1 emissions (metric tons CO2e)
United States of America	33941
Other, please specify (Rest of world)	11132

C7.3

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

By business division

C7.3a

(C7.3a) Break down your total gross global Scope 1 emissions by business division.

Business division	Scope 1 emissions (metric ton CO2e)
Alphabet Inc.	45073

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)
United States of America	4740515	768230
Other, please specify (Rest of world)	1835724	1054902

C7.6

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

By business division

C7.6a

(C7.6a) Break down your total gross global Scope 2 emissions by business division.

Business division	Scope 2, location-based (metric tons CO2e)	Scope 2, market-based (metric tons CO2e)
Alphabet Inc.	6576239	1823132

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	200573	Increased	21	In 2021, our additional renewable power purchases (in excess of our 2020 renewable power purchases) resulted in an increase of 200,573 tCO2e to compared our 2020 emissions reduction from renewable energy consumption. We arrived at this total by assessing the difference between our emissions reduced from renewable energy PPAs in 2020 (location-based Scope 2 emissions minus market-based Scope 2 emissions) and the emissions reduced from renewable energy PPAs in 2021. In 2020, our total Scope 1 and market-based Scope 2 emissions were 950,109 tCO2e. Therefore we arrived at this percentage increase as follows: $(200,573 / 950,109) \times 100 = 21\%$. Since 2011, our renewable energy purchasing has resulted in emissions savings of more than 24 million tCO2e—a cumulative 65% reduction in our Scope 1 and 2 emissions over this period. We have a few facilities located in geographies where we're not currently able to source large volumes of renewable energy, so we currently make up for this by buying surplus renewable energy in regions where it's abundant. For example, by buying larger amounts of wind energy in places like Europe, we compensate for our lack of renewable energy purchases in Asia. This approach results in Google's Scope 2 market-based emissions being greater than zero as per the Greenhouse Gas Protocol Scope 2 Guidance, despite us achieving our 100% renewable energy match globally.
Other emissions reduction activities	7414	Decreased	1	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 2021, our energy efficiency efforts resulted in a reduction of 7,414 tCO2e beyond our 2020 emissions reduction activities. In 2020, our total Scope 1 and market-based Scope 2 emissions were 950,109 tCO2e. Therefore we arrived at this percentage decrease as follows: $(7,414 / 950,109) \times 100 = .78\%$. We believe that our emissions reduction activities are much larger than the savings we are able to quantify from our energy efficiency initiatives. We have done our best to estimate the contribution from our emissions reduction activities, but the actual numbers could be different due to changes in other factors, such as emissions factors and weather. This estimate should be considered a lower bound as it does not include the many small emission reductions projects we've undertaken that are difficult to quantify.
Divestment		<Not Applicable >		
Acquisitions		<Not Applicable >		
Mergers		<Not Applicable >		
Change in output	918096	Increased	97	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 2020 to 2021 reported data, growth of our business created a 97% increase in our emissions compared to the emissions we reported last year. This change in output was calculated by taking our 2021 Scope 1 and market-based Scope 2 emissions minus the 2020 Scope 1 and market-based Scope 2 emissions, divided by the 2020 Scope 1 and market-based Scope 2 emissions, then multiplied by 100. Therefore we arrived at this percentage increase as follows: $(1,868,205 - 950,109 / 950,109) \times 100 = 97\%$. This percent change would also be approximately a 12% increase if it were calculated using our location-based Scope 2 emissions. Despite an increase in our total procurement of renewable energy in 2021 to match 100% of the electricity consumption of our operations, we have a few data center locations (i.e. Singapore) on grids where we are currently not able to source large volumes of renewable energy or where we are currently not able to source renewable energy. Our operations at some of these sites grew last year, resulting in a slight increase in our total market-based Scope 2 emissions. This is one contributor to this increase in emissions.
Change in methodology		<Not Applicable >		
Change in boundary		<Not Applicable >		
Change in physical operating conditions		<Not Applicable >		
Unidentified		<Not Applicable >		
Other		<Not Applicable >		

C7.9b

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

Market-based

C8. Energy

C8.1

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

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

C8.2

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

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

C8.2a

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

	Heating value	MWh from renewable sources	MWh from non-renewable sources	Total (renewable and non-renewable) MWh
Consumption of fuel (excluding feedstock)	LHV (lower heating value)	13858	191329	205187
Consumption of purchased or acquired electricity	<Not Applicable>	13339261	4899130	18238390
Consumption of purchased or acquired heat	<Not Applicable>	0	119271	119271
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>	8811	<Not Applicable>	8811
Total energy consumption	<Not Applicable>	13361929	5209730	18571659

C8.2b

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

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

C8.2c

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

Sustainable biomass

Heating value

Unable to confirm heating value

Total fuel MWh consumed by the organization

0

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

Comment

Other biomass

Heating value

Unable to confirm heating value

Total fuel MWh consumed by the organization

0

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

Comment

Other renewable fuels (e.g. renewable hydrogen)

Heating value

LHV

Total fuel MWh consumed by the organization

13858

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

Comment

Renewable diesel (i.e. 100% renewable with no fossil fuels) is not used for self-generation.

Coal

Heating value

Unable to confirm heating value

Total fuel MWh consumed by the organization

0

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

Comment

Oil

Heating value

LHV

Total fuel MWh consumed by the organization

107911

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

Comment

This includes consumption of the following fuel types: diesel / gas oil, jet kerosene, motor gasoline. aviation gasoline, and on-road diesel.

Gas

Heating value

LHV

Total fuel MWh consumed by the organization

83418

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

Comment

Other non-renewable fuels (e.g. non-renewable hydrogen)

Heating value

Unable to confirm heating value

Total fuel MWh consumed by the organization

0

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

Comment

Total fuel**Heating value**

LHV

Total fuel MWh consumed by the organization

205187

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

Comment**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	37044	37044	8811	8811
Heat	83418	83418	0	0
Steam	0	0	0	0
Cooling	0	0	0	0

C8.2g**(C8.2g) Provide a breakdown of your non-fuel energy consumption by country.****Country/area**

United States of America

Consumption of electricity (MWh)

12903398

Consumption of heat, steam, and cooling (MWh)

62170

Total non-fuel energy consumption (MWh) [Auto-calculated]

12965568

Is this consumption excluded from your RE100 commitment?

Please select

Country/area

Other, please specify (International)

Consumption of electricity (MWh)

5383745

Consumption of heat, steam, and cooling (MWh)

57101

Total non-fuel energy consumption (MWh) [Auto-calculated]

5440846

Is this consumption excluded from your RE100 commitment?

Please select

C8.2h**(C8.2h) Provide details of your organization's renewable electricity purchases in the reporting year by country****Country/area of renewable electricity consumption**

Chile

Sourcing method

Direct procurement from an offsite grid-connected generator e.g. Power Purchase Agreement (PPA)

Renewable electricity technology type

Solar

Renewable electricity consumed via selected sourcing method in the reporting year (MWh)

271963

Tracking instrument used

Other, please specify (Environmental Attributes Attestation)

Total attribute instruments retained for consumption by your organization (MWh)

271963

Country/area of origin (generation) of the renewable electricity/attribute consumed

Chile

Commissioning year of the energy generation facility (e.g. date of first commercial operation or repowering)**Vintage of the renewable energy/attribute (i.e. year of generation)**

2021

Brand, label, or certification of the renewable electricity purchase

No brand, label, or certification

Comment

In 2021, our wind and solar deals, together with the renewable electricity that comes from the grid, produced enough renewable energy to match 100% of the global electricity consumption of our offices, data centers, and networking infrastructure for the fifth consecutive year.

Country/area of renewable electricity consumption

Singapore

Sourcing method

Direct procurement from an offsite grid-connected generator e.g. Power Purchase Agreement (PPA)

Renewable electricity technology type

Solar

Renewable electricity consumed via selected sourcing method in the reporting year (MWh)

13800

Tracking instrument used

Other, please specify (Environmental Attributes Attestation)

Total attribute instruments retained for consumption by your organization (MWh)

13800

Country/area of origin (generation) of the renewable electricity/attribute consumed

Singapore

Commissioning year of the energy generation facility (e.g. date of first commercial operation or repowering)**Vintage of the renewable energy/attribute (i.e. year of generation)**

2021

Brand, label, or certification of the renewable electricity purchase

No brand, label, or certification

Comment

In 2021, our wind and solar deals, together with the renewable electricity that comes from the grid, produced enough renewable energy to match 100% of the global electricity consumption of our offices, data centers, and networking infrastructure for the fifth consecutive year.

Country/area of renewable electricity consumption

United States of America

Sourcing method

Direct procurement from an offsite grid-connected generator e.g. Power Purchase Agreement (PPA)

Renewable electricity technology type

Renewable electricity mix, please specify (Wind, Solar)

Renewable electricity consumed via selected sourcing method in the reporting year (MWh)

10099670

Tracking instrument used

US-REC

Total attribute instruments retained for consumption by your organization (MWh)

10099670

Country/area of origin (generation) of the renewable electricity/attribute consumed

United States of America

Commissioning year of the energy generation facility (e.g. date of first commercial operation or repowering)**Vintage of the renewable energy/attribute (i.e. year of generation)**

2021

Brand, label, or certification of the renewable electricity purchase

No brand, label, or certification

Comment

In 2021, our wind and solar deals, together with the renewable electricity that comes from the grid, produced enough renewable energy to match 100% of the global

electricity consumption of our offices, data centers, and networking infrastructure for the fifth consecutive year.

Country/area of renewable electricity consumption

Belgium

Sourcing method

Direct procurement from an offsite grid-connected generator e.g. Power Purchase Agreement (PPA)

Renewable electricity technology type

Wind

Renewable electricity consumed via selected sourcing method in the reporting year (MWh)

207972

Tracking instrument used

GO

Total attribute instruments retained for consumption by your organization (MWh)

207972

Country/area of origin (generation) of the renewable electricity/attribute consumed

Belgium

Commissioning year of the energy generation facility (e.g. date of first commercial operation or repowering)

Vintage of the renewable energy/attribute (i.e. year of generation)

2021

Brand, label, or certification of the renewable electricity purchase

No brand, label, or certification

Comment

In 2021, our wind and solar deals, together with the renewable electricity that comes from the grid, produced enough renewable energy to match 100% of the global electricity consumption of our offices, data centers, and networking infrastructure for the fifth consecutive year. We selected Belgium in the 'Country/area of renewable electricity consumption', however, the renewable electricity from these PPAs is consumed in the European market, including Finland, Greece, Sweden, Hungary, Italy, United Kingdom, Norway, Turkey, Denmark, Ukraine, Belgium, Austria, France, Portugal, the Netherlands, Romania, Czech Republic, Switzerland, Lithuania, Ireland, Poland, Germany, Croatia, Spain, and the Slovak Republic.

Country/area of renewable electricity consumption

Denmark

Sourcing method

Direct procurement from an offsite grid-connected generator e.g. Power Purchase Agreement (PPA)

Renewable electricity technology type

Solar

Renewable electricity consumed via selected sourcing method in the reporting year (MWh)

121471

Tracking instrument used

GO

Total attribute instruments retained for consumption by your organization (MWh)

121471

Country/area of origin (generation) of the renewable electricity/attribute consumed

Denmark

Commissioning year of the energy generation facility (e.g. date of first commercial operation or repowering)

Vintage of the renewable energy/attribute (i.e. year of generation)

2021

Brand, label, or certification of the renewable electricity purchase

No brand, label, or certification

Comment

In 2021, our wind and solar deals, together with the renewable electricity that comes from the grid, produced enough renewable energy to match 100% of the global electricity consumption of our offices, data centers, and networking infrastructure for the fifth consecutive year. We selected Denmark in the 'Country/area of renewable electricity consumption', however, the renewable electricity from these PPAs is consumed in the European market, including Finland, Greece, Sweden, Hungary, Italy, United Kingdom, Norway, Turkey, Denmark, Ukraine, Belgium, Austria, France, Portugal, the Netherlands, Romania, Czech Republic, Switzerland, Lithuania, Ireland, Poland, Germany, Croatia, Spain, and the Slovak Republic.

Country/area of renewable electricity consumption

Finland

Sourcing method

Direct procurement from an offsite grid-connected generator e.g. Power Purchase Agreement (PPA)

Renewable electricity technology type

Wind

Renewable electricity consumed via selected sourcing method in the reporting year (MWh)

528272

Tracking instrument used

GO

Total attribute instruments retained for consumption by your organization (MWh)

528272

Country/area of origin (generation) of the renewable electricity/attribute consumed

Finland

Commissioning year of the energy generation facility (e.g. date of first commercial operation or repowering)**Vintage of the renewable energy/attribute (i.e. year of generation)**

2021

Brand, label, or certification of the renewable electricity purchase

No brand, label, or certification

Comment

In 2021, our wind and solar deals, together with the renewable electricity that comes from the grid, produced enough renewable energy to match 100% of the global electricity consumption of our offices, data centers, and networking infrastructure for the fifth consecutive year. We selected Finland in the 'Country/area of renewable electricity consumption', however, the renewable electricity from these PPAs is consumed in the European market, including Finland, Greece, Sweden, Hungary, Italy, United Kingdom, Norway, Turkey, Denmark, Ukraine, Belgium, Austria, France, Portugal, the Netherlands, Romania, Czech Republic, Switzerland, Lithuania, Ireland, Poland, Germany, Croatia, Spain, and the Slovak Republic.

Country/area of renewable electricity consumption

Netherlands

Sourcing method

Direct procurement from an offsite grid-connected generator e.g. Power Purchase Agreement (PPA)

Renewable electricity technology type

Renewable electricity mix, please specify (Wind, Solar)

Renewable electricity consumed via selected sourcing method in the reporting year (MWh)

189105

Tracking instrument used

GO

Total attribute instruments retained for consumption by your organization (MWh)

189105

Country/area of origin (generation) of the renewable electricity/attribute consumed

Netherlands

Commissioning year of the energy generation facility (e.g. date of first commercial operation or repowering)**Vintage of the renewable energy/attribute (i.e. year of generation)**

2021

Brand, label, or certification of the renewable electricity purchase

No brand, label, or certification

Comment

In 2021, our wind and solar deals, together with the renewable electricity that comes from the grid, produced enough renewable energy to match 100% of the global electricity consumption of our offices, data centers, and networking infrastructure for the fifth consecutive year. We selected the Netherlands in the 'Country/area of renewable electricity consumption', however, the renewable electricity from these PPAs is consumed in the European market, including Finland, Greece, Sweden, Hungary, Italy, United Kingdom, Norway, Turkey, Denmark, Ukraine, Belgium, Austria, France, Portugal, the Netherlands, Romania, Czech Republic, Switzerland, Lithuania, Ireland, Poland, Germany, Croatia, Spain, and the Slovak Republic.

Country/area of renewable electricity consumption

Norway

Sourcing method

Direct procurement from an offsite grid-connected generator e.g. Power Purchase Agreement (PPA)

Renewable electricity technology type

Wind

Renewable electricity consumed via selected sourcing method in the reporting year (MWh)

497646

Tracking instrument used

GO

Total attribute instruments retained for consumption by your organization (MWh)

497646

Country/area of origin (generation) of the renewable electricity/attribute consumed

Norway

Commissioning year of the energy generation facility (e.g. date of first commercial operation or repowering)**Vintage of the renewable energy/attribute (i.e. year of generation)**

2021

Brand, label, or certification of the renewable electricity purchase

No brand, label, or certification

Comment

In 2021, our wind and solar deals, together with the renewable electricity that comes from the grid, produced enough renewable energy to match 100% of the global electricity consumption of our offices, data centers, and networking infrastructure for the fifth consecutive year. We selected Norway in the 'Country/area of renewable electricity consumption', however, the renewable electricity from these PPAs is consumed in the European market, including Finland, Greece, Sweden, Hungary, Italy,

Country/area of renewable electricity consumption

Sweden

Sourcing method

Direct procurement from an offsite grid-connected generator e.g. Power Purchase Agreement (PPA)

Renewable electricity technology type

Wind

Renewable electricity consumed via selected sourcing method in the reporting year (MWh)

1409362

Tracking instrument used

GO

Total attribute instruments retained for consumption by your organization (MWh)

1409362

Country/area of origin (generation) of the renewable electricity/attribute consumed

Sweden

Commissioning year of the energy generation facility (e.g. date of first commercial operation or repowering)

Vintage of the renewable energy/attribute (i.e. year of generation)

2021

Brand, label, or certification of the renewable electricity purchase

No brand, label, or certification

Comment

In 2021, our wind and solar deals, together with the renewable electricity that comes from the grid, produced enough renewable energy to match 100% of the global electricity consumption of our offices, data centers, and networking infrastructure for the fifth consecutive year. We selected Norway in the 'Country/area of renewable electricity consumption', however, the renewable electricity from these PPAs is consumed in the European market, including Finland, Greece, Sweden, Hungary, Italy, United Kingdom, Norway, Turkey, Denmark, Ukraine, Belgium, Austria, France, Portugal, the Netherlands, Romania, Czech Republic, Switzerland, Lithuania, Ireland, Poland, Germany, Croatia, Spain, and the Slovak Republic.

C8.2i

(C8.2i) Provide details of your organization's low-carbon heat, steam, and cooling purchases in the reporting year by country.

C8.2j

(C8.2j) Provide details of your organization's renewable electricity generation by country in the reporting year.

C8.2k

(C8.2k) Describe how your organization's renewable electricity sourcing strategy directly or indirectly contributes to bringing new capacity into the grid in the countries/areas in which you operate.

C8.2l

(C8.2l) In the reporting year, has your organization faced any challenges to sourcing renewable electricity?

	Challenges to sourcing renewable electricity	Challenges faced by your organization which were not country-specific
Row 1	Please select	<Not Applicable>

C9. Additional metrics

C9.1

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

Description

Energy usage

Metric value

0.1

Metric numerator

Noncomputing overhead data center energy use

Metric denominator (intensity metric only)

Energy used to power IT equipment

% change from previous year

0

Direction of change

No change

Please explain

Google's data center energy metric is the ratio of noncomputing overhead energy use divided by IT equipment energy use. This ratio was 0.10 in 2020 and 2021, which indicates relatively constant energy efficiency year-over-year. For more than a decade, we've worked to make Google data centers some of the most efficient in the world, improving their environmental performance even as demand for our products has dramatically risen. This metric is closely related to power usage effectiveness (PUE), which is a standard data center industry ratio. PUE compares total data center energy (IT + noncomputing overhead like cooling and power distribution) to IT energy. A PUE of 2.0 means that for every watt of IT power, an additional watt is consumed to cool and distribute power to the IT equipment. A PUE closer to 1.0 means nearly all the energy is used for computing. We measure and monitor PUE vigilantly and Google's data center staff have access to real-time data. Each quarter, we publish PUE data on our public website. For more information, see: <https://www.google.com/about/datacenters/efficiency/> In 2021, the average annual PUE for our global fleet of data centers was 1.10, compared with the industry average of 1.57—meaning that our data centers use about six times less overhead energy.

C10. Verification

C10.1

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

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

C10.1a

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

Verification or assurance cycle in place

Annual process

Status in the current reporting year

Complete

Type of verification or assurance

Limited assurance

Attach the statement

[alphabet-fy2021-environmental-indicators-assurance-letter.pdf](#)

Page/ section reference

Pages 1 to 4

Relevant standard

Attestation standards established by AICPA (AT105)

Proportion of reported emissions verified (%)

100

C10.1b

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

Scope 2 approach

Scope 2 location-based

Verification or assurance cycle in place

Annual process

Status in the current reporting year

Complete

Type of verification or assurance

Limited assurance

Attach the statement

[alphabet-fy2021-environmental-indicators-assurance-letter.pdf](#)

Page/ section reference

Pages 1 to 4

Relevant standard

Attestation standards established by AICPA (AT105)

Proportion of reported emissions verified (%)

100

Scope 2 approach

Scope 2 market-based

Verification or assurance cycle in place

Annual process

Status in the current reporting year

Complete

Type of verification or assurance

Limited assurance

Attach the statement

[alphabet-fy2021-environmental-indicators-assurance-letter.pdf](#)

Page/ section reference

Pages 1 to 4

Relevant standard

Attestation standards established by AICPA (AT105)

Proportion of reported emissions verified (%)

100

C10.1c

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

Scope 3 category

Scope 3: Business travel

Verification or assurance cycle in place

Annual process

Status in the current reporting year

Complete

Type of verification or assurance

Limited assurance

Attach the statement

[alphabet-fy2021-environmental-indicators-assurance-letter.pdf](#)

Page/section reference

Pages 1 to 4

Relevant standard

Attestation standards established by AICPA (AT105)

Proportion of reported emissions verified (%)

100

Scope 3 category

Scope 3: Employee commuting

Verification or assurance cycle in place

Annual process

Status in the current reporting year

Complete

Type of verification or assurance

Limited assurance

Attach the statement

[alphabet-fy2021-environmental-indicators-assurance-letter.pdf](#)

Page/section reference

Pages 1 to 4

Relevant standard

Attestation standards established by AICPA (AT105)

Proportion of reported emissions verified (%)

100

C10.2

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

Yes

C10.2a

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

Disclosure module verification relates to	Data verified	Verification standard	Please explain
C6. Emissions data	Product footprint verification	ISO 14040:2006 and ISO 14044:2006	We produced product environmental reports for all of our Pixel and Nest flagship products released in 2021 (Pixel 6, Pixel 6 Pro, Pixel 5a (5G), Nest Cam (indoor, wired), Nest Cam (outdoor or indoor, battery), Nest Doorbell (battery), Nest Hub (2nd generation)). 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.
C6. Emissions data	Other, please specify (Carbon intensity metrics)	Attestation standards established by the American Institute of Certified Public Accountants (AICPA) AT-C section 105, Concepts Common to All Attestation Engagements, and AT-C section 210, Review Engagements	The following carbon intensity metrics were externally assured as part of our Independent Accountants' Review: - Scope 1 + Scope 2 emissions intensity per unit of revenue - Scope 1 + Scope 2 emissions intensity per full-time equivalent employee (FTE) - Scope 1 + Scope 2 emissions intensity per MWh of energy consumed
C8. Energy	Renewable energy products	Our carbon footprint is externally assured according to the Attestation standards established by AICPA (AT105), however the assurance body does not verify the renewable energy credits (RECs) or the Guarantees of Origin (GOOs).	Our carbon footprint is externally assured. The assurance body does not verify the renewable energy contractual instruments, e.g. renewable energy credits (RECs) or the Guarantees of Origin (GOOs). The assurance process ensures that the renewable energy contractual instruments used in our Scope 2 emissions accounting meet the Scope 2 Quality Criteria outlined in the GHG Protocol Scope 2 Guidance.
C8. Energy	Energy consumption	Attestation standards established by the American Institute of Certified Public Accountants (AICPA) AT-C section 105, Concepts Common to All Attestation Engagements, and AT-C section 210, Review Engagements	Total energy consumption is externally assured as part of our Independent Accountants' Review.
C6. Emissions data	Other, please specify (Biogenic emissions)	Attestation standards established by the American Institute of Certified Public Accountants (AICPA) AT-C section 105, Concepts Common to All Attestation Engagements, and AT-C section 210, Review Engagements	Our biogenic GHG emissions are externally assured as part of our Independent Accountants' Review.
C8. Energy	Other, please specify (Percentage of electricity procured from renewable sources)	Attestation standards established by the American Institute of Certified Public Accountants (AICPA) AT-C section 105, Concepts Common to All Attestation Engagements, and AT-C section 210, Review Engagements	Our percentage of electricity procured from renewable energy sources is externally assured as part of our Independent Accountants' Review.
C8. Energy	Other, please specify (Total electricity consumption)	Attestation standards established by the American Institute of Certified Public Accountants (AICPA) AT-C section 105, Concepts Common to All Attestation Engagements, and AT-C section 210, Review Engagements	Total electricity consumption is externally assured as part of our Independent Accountants' Review.

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

4.03

% of Scope 2 emissions covered by the ETS

0

Period start date

January 1 2021

Period end date

December 31 2021

Allowances allocated

1815

Allowances purchased

1815

Verified Scope 1 emissions in metric tons CO₂e

1815

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 related to the EU ETS. As an example of a case study, the scope of the revised EU ETS legislations covered small emitters and, as a result, our EU data centers were required to apply for ETS Permits. Google has six data centers in Europe. The EU ETS directive requires operators of installations, which are included in the scope to hold a valid GHG emission monitoring plan issued by the relevant Competent Authority, to monitor and report their emissions, to have the reports verified by an independent and accredited verifier, and to purchase and surrender the equivalent number of allowances on an annual basis through approved operators holding accounts on the Union Registry. Our strategy is to continue to follow these directives of the EU ETS. As a result, we are in compliance with the EU ETS. With regards to timescale of implementation, in 2021, we followed the annual compliance cycle of the EU ETS. For more information, [see https://ec.europa.eu/clima/eu-action/eu-emissions-trading-system-eu-ets/monitoring-reporting-and-verification-eu-ets-emissions_en](https://ec.europa.eu/clima/eu-action/eu-emissions-trading-system-eu-ets/monitoring-reporting-and-verification-eu-ets-emissions_en)

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)

138180

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

138180

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. We have also used carbon prices for other areas of our business.

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

51

Variance of price(s) used

We've referenced and considered the social cost of carbon recommended by the U.S. Federal Government's Interagency Working Group on the Social Cost of Greenhouse Gases, which assessed the value for carbon dioxide at \$51 per metric ton for emissions year 2020 at a 3% average discount rate. Reference: Technical Support Document: Social Cost of Carbon, Methane, and Nitrous Oxide Interim Estimates under Executive Order 13990, Interagency Working Group on Social Cost of Greenhouse Gases, United States Government (February 2021), page 5. 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. We use different prices for different implementations, and may reevaluate our carbon price as needed.

Type of internal carbon price

Shadow price

Impact & implication

As of December 31, 2021, Google had 23 data center locations across North America, South America, Europe, and Asia. Our long-standing data center efficiency efforts are more important than ever because our data centers represent the vast majority of our electricity use. Google faces the risk of increased costs of energy if a price on carbon is applied through legislation such as cap and trade (or other mechanisms such as taxation). To the extent that this price is passed on to us from a regulated entity, the cost of running our operations will increase. However, we already operate some of the most efficient data centers in the world, procure renewable energy for our operations, and generate onsite renewable energy at several of our offices and data centers, all of which reduce our exposure to this risk. In addition, we already include a shadow price for carbon in our data center siting analysis so we take this risk into account even before we build a data center. Finally, we reach carbon neutrality for our operations via three steps: energy efficiency, renewable energy procurement, and purchasing high-quality carbon credits for any remaining emissions we haven't yet eliminated. We have also considered a social cost of carbon for other areas of our business. As a hypothetical example, if a carbon price of e.g. \$51/metric tonne were established through regulation (social cost of carbon recommended by the U.S. Federal Government as referenced above), this could increase our costs by approximately \$95 million, assuming these costs were passed through to electricity consumers and we were not further able to reduce our carbon footprint. This was calculated by adding our 2021 Scope 1 and 2021 Scope 2 market-based emissions, and then multiplying by the aforementioned carbon price example [= (2021 Scope 1 + market-based Scope 2) x \$51]. The financial impact would likely be less as we already voluntarily purchase carbon credits. 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/clients
- 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
Provide training, support, and best practices on how to make credible renewable energy usage claims
Directly work with suppliers on exploring corporate renewable energy sourcing mechanisms
Climate change performance is featured in supplier awards scheme

% of suppliers by number

89

% total procurement spend (direct and indirect)

92

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

94

Rationale for the coverage of your engagement

We have a goal to engage with suppliers to reduce their GHG emissions, as mandated in our Supplier Code of Conduct (SCOC). In 2021, our Supplier Responsibility program engaged with 580 active suppliers supporting hardware manufacturing and related services, and professional services. Of those, 519 (89%) active suppliers have signed our SCOC, which forms the basis of our supplier sustainability profile survey and our supplier assessments, & articulates our overall requirements for resource efficiency, including energy and emissions. All suppliers are required to sign our SCOC (included in our contracts). In 2021, our active hardware suppliers who signed our SCOC covered 92% of our total spend and 94% of Scope 3 emissions. Spend is calculated based on our purchase orders with suppliers providing manufacturing services or products. The % Scope 3 emissions metric was estimated for manufacturing emissions from our direct hardware suppliers and excludes full upstream emissions for which we do not have direct supplier relationships. We've integrated sustainability criteria into our supplier sourcing and performance management processes, including assessing suppliers' practices to report, manage and reduce their emissions and incorporating them into our supplier scorecard. The data is also used to help set goals and priorities for our sustainability program by supplier, commodity and region and to verify data, refine allocations and continually improve our analyses of supply chain GHG emissions. In 2021, we continued to refine our assessment of GHG emissions associated with services, such as marketing, professional services, and construction services. In 2021, our Energy Efficiency and Renewable Energy program continued to engage our suppliers to analyze their energy performance and energy management practices in their manufacturing sites, and develop and implement a comprehensive energy efficiency and renewable energy plan to maximize energy savings and payback. In 2021, we continued working toward our target of enabling 5 GW of new carbon-free energy through investments in our key manufacturing regions by 2030. We also collaborated with suppliers and other stakeholders in our value chain on circular economy pathways, and successfully continued our program to build disk drives with recovered rare-earth magnets and quantified the life cycle environmental impacts.

Impact of engagement, including measures of success

In 2021, we used the CDP Supply Chain platform and custom surveys to request climate and water data from 252 suppliers (both direct spend and indirect spend) and provided individualized feedback on their performance for key KPIs (e.g. emission reduction targets). Our measures of success from engaging our suppliers in GHG emissions reporting and reduction include: response rate, proportion of suppliers reporting GHG emissions, and proportion of suppliers with GHG emissions reduction targets. Some of our thresholds to measure success include: a response rate of at least 90%, 80% of our suppliers reporting GHG emissions, and 50% of suppliers having a GHG emissions reduction target. Another measure of success is increasing renewable energy use in our supply chain. Example of impact of engagement on GHG emissions: In 2021, climate change reporting rates by our suppliers decreased compared to 2020 across all metrics. This is expected due to a high number of first-time responders. We invited 30% more suppliers in 2021, and expanded our program to include indirect spend suppliers. We achieved a response rate of 95% to our climate change survey requests, 89% of our suppliers reported at least one source of GHG emissions (Scope 1 and/or Scope 2 emissions) and 72% of our suppliers had set a GHG emissions reduction target. Example of impact of engagement on renewable energy use: The high cost of renewables is a persistent barrier in markets outside the United States and Europe. In addition, many energy markets have few mechanisms—or none at all—through which companies can credibly purchase renewable energy. To begin addressing this barrier, we worked alongside seven other major corporations on a clean power option in Japan. The team and its supplier partners have created a clean energy option for buyers in Japan centered on repowering hydroelectric facilities and leveraging retail electricity contracts aligned with local procurement norms. We aim to replicate successes from the platform in Japan to reduce the cost and accelerate supplier adoption of renewable energy in other key supply markets around the world.

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 & Details of engagement

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

% of customers by number

100

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

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

Alphabet reports to CDP's Supply Chain program, making our carbon footprint data available to the 69 customers that requested this data from Alphabet for FY2021. We believe that environmental impact should be an important consideration—alongside factors such as price, security, openness, & reliability—when it comes to data storage, processing & development. In 2021, we matched 100% of the electricity consumption of our operations with renewable energy purchases for the 5th consecutive year. Reaching this milestone was important to us, but it also mattered to many of our customers. Rationale for group of customers & scope of engagement: We operate the cleanest cloud in the industry. We are working with a growing group of cloud customers focused on reducing the carbon impact of their operations. We partner with these customers because they are keen to cut carbon emissions, explore new ways to protect the earth's resources, better harness renewable energy, & improve the sustainability of their IT infrastructure. We've helped evaluate customer IT estates & have seen potential net-carbon reductions from a few thousand kilograms of CO2e to many kilotons. To help our customers achieve these IT carbon reductions & make decisions about moving to more sustainable data center options, we've shared an average hourly Carbon Free Energy Percentage for the majority of our Google Cloud regions, as well as a Google Cloud region picker. We produce & promote content to our Cloud customers about our sustainability & climate change strategy & performance. For example, our cloud.google.com/sustainability/ microsite helps businesses understand the environmental impact of their operations & how switching to Google Cloud can help reduce it. We also publish content on the importance of taking sustainability into account with regards to infrastructure & application development, & we continue to host webinars, virtual roundtables, & executive engagement sessions on cloud sustainability. Our sales teams work with customers to share tools for calculating the potential emissions impact of migrations of applications to the cloud, workshops for architecting applications in the most carbon-free way possible, & best practices to make their IT more sustainable. We also include information on our climate change strategy & performance at annual events such as Google Cloud Next.

Impact of engagement, including measures of success

One of our measures of success is working with customers to measure, report, and reduce their cloud carbon emissions. Threshold to measure success: Reduction in cloud customer carbon emissions. Impact of engagement through the Carbon Sense suite of products: - Carbon Footprint is available to every GCP user for free in the Cloud Console. This tool provides customers with the gross carbon emissions associated with their Google Cloud Platform usage. - Active Assist is an intelligent tool that proactively helps customers reduce cloud emissions. In 2021, we found that there were over 600,000 gross kgCO2e in seemingly idle projects across Google Cloud. - Low-carbon mode enables customers to restrict their cloud resources to low-carbon locations across our infrastructure. Relative to other choices, customers may be able to lower carbon emissions by 5-10x. - New customers who see the low-carbon region icons in Google Cloud Region Picker are over 50% more likely to choose clean regions over others, ensuring their applications emit less carbon over time. We've also helped customers reduce their emissions through the use of our carbon-neutral services. For example, National Geographic Partners migrated its entire image library application from its data center to Google Cloud to improve the security and management of the collection. Moving to Google Cloud reduced energy and emissions of the image collection by approximately 62%. (See the Google Cloud Next '19 presentation: <https://www.youtube.com/watch?v=gsAlg8DVIQY&t=11m00s>) Other measures of success: Unique views for our Google Cloud sustainability microsite (<https://cloud.google.com/sustainability/>) and blogs, message pull-through by media and press, social media impressions from tweets related to this content, attendees at climate-focused Cloud OnAir webinars, and the number of prospective and new customers asking about or mentioning the environmental performance of Google Cloud. We also offer a sustainability presentation to customers who come to our Executive Briefing Center and we have also trained our sales team to communicate these key messages to prospective and existing customers. This engagement has impacted the decision of customers to use Google Cloud products. (See <https://www.blog.google/products/google-cloud/engineered-renewal-google-cloud-etsy-and-sustainability/>).

C12.1d

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

Our carbon-free ambitions reach far beyond Google's own operations. Business and policy makers across the world play a deciding role in climate action. That's why, for more than a decade, we have offered solutions to support our partners' carbon goals and initiatives. We engage with partners—including businesses, governments, nonprofits, communities, and individuals—on climate-related issues in various capacities.

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

As an example of a case study, in 2011, Geo partnered with the Environmental Defense Fund (EDF) to measure and map methane leaks under city streets. To do this, we deployed methane analyzers mounted on Google Street View cars to build insights that have helped community groups, utilities, and regulators get a better understanding of methane leaks and identify opportunities for improvements. As a result, New Jersey's PSE&G approved a plan to replace up to 510 miles of old pipe based on this data.

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

In 2020, we made a commitment to help more than 500 cities and local governments reduce an aggregate of 1 gigaton of carbon emissions annually by 2030. To do this, we'll empower city planners and policymakers with EIE to make it easier for cities to measure progress against their climate action plans. (See insights.sustainability.google).

By the end of 2021, nearly 42,000 cities and regions worldwide were covered by EIE. To scale data access to local governments, policymakers, and community groups, we're developing partnerships with organizations, councils, and climate change experts. This includes working closely with key city networks such as the Global Covenant of Mayors for Climate and Energy, C40, and ICLEI to validate the data and help cities leverage the new information. Our partnerships also include consulting organizations such as Ironbark Sustainability and Beyond Zero Emissions, which made EIE transportation data available in Snapshot—a free climate tool that calculates major sources of carbon emissions, including stationary energy, transport, waste, agriculture, and land-use change for Australian city councils.

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. In 2021, we celebrated 10 years of hosting our Geo for Good Summit, where we brought together over 1,500 scientists and practitioners from around the world who are working on positive social and environmental impact using Earth Engine and Google mapping tools.

Additionally, Google's tools help further the dissemination of climate information through the Google for Nonprofits program. This program offers eligible nonprofit organizations access to Google tools like Google Workspace (including Gmail, Calendar, and Drive), Google Ad Grants, YouTube for Nonprofits, and Google Maps, all at no charge. This effort aims to support the social impact of nonprofits through easy access to Google's highly efficient products and services. 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. As an example, Instituto Socioambiental used Ad Grants, Google Earth, and Google Cloud to advance their mission of protecting Brazil's socio-environmental diversity. (See <https://blog.google/outreach-initiatives/nonprofits/how-photos-can-curb-illegal-deforestation-amazon/>).

C12.2

(C12.2) Do your suppliers have to meet climate-related requirements as part of your organization's purchasing process?

Yes, climate-related requirements are included in our supplier contracts

C12.2a

(C12.2a) Provide details of the climate-related requirements that suppliers have to meet as part of your organization's purchasing process and the compliance mechanisms in place.

Climate-related requirement

Climate-related disclosure through a public platform

Description of this climate related requirement

In 2021, our Supplier Responsibility program engaged with 580 active suppliers supporting hardware manufacturing and related services, marketing and professional services. Of those, 519 (89%) active suppliers have signed our Supplier Code of Conduct, which forms the basis of our supplier sustainability profile survey and our supplier assessments, and articulates our overall requirements for resource efficiency, including energy and emissions. Suppliers are required to track, document, and seek to minimize energy consumption and greenhouse gas emissions. This can be via public or non-public platforms.

% suppliers by procurement spend that have to comply with this climate-related requirement

100

% suppliers by procurement spend in compliance with this climate-related requirement

92

Mechanisms for monitoring compliance with this climate-related requirement

Supplier self-assessment
On-site third-party verification
Supplier scorecard or rating

Response to supplier non-compliance with this climate-related requirement

Retain and engage

Climate-related requirement

Setting a science-based emissions reduction target

Description of this climate related requirement

Progress to-date: In 2021, we used the CDP Supply Chain platform and custom surveys to request climate and water data from 252 suppliers (both direct spend and indirect spend). We achieved a response rate of 95% to our climate change survey requests, 89% of our suppliers reported at least one source of GHG emissions (Scope 1 and/or Scope 2 emissions), and 72% of our suppliers had set a GHG emissions reduction target. Although not implemented as a formal requirement as of the end of 2021, during Google's 2022 Supplier Sustainability Summit we communicated the expectation for suppliers to publicly set targets to reduce GHG emissions. By 2030, Google aims to achieve net-zero emissions across all of our operations and value chain. We will actively work with our suppliers to develop net zero roadmaps. Explanation of percentages: Given that this expectation has not been implemented as a formal requirement as of the end of 2021, we are unable to provide estimated percentages for supplier compliance. For the purpose of CDP reporting, we have put 1% for the "% suppliers by procurement spend that have to comply with this climate-related requirement" and 0% for the "% suppliers by procurement spend in compliance with this climate-related requirement."

% suppliers by procurement spend that have to comply with this climate-related requirement

1

% suppliers by procurement spend in compliance with this climate-related requirement

0

Mechanisms for monitoring compliance with this climate-related requirement

Other, please specify (This has not been implemented as of the end of 2021, however, we already have a process to request climate data from suppliers through CDP's Supply Chain platform, which includes requesting details about suppliers' GHG emissions reduction targets.)

Response to supplier non-compliance with this climate-related requirement

Other, please specify (This has not been implemented as of the end of 2021. We will actively work with our suppliers to develop net zero roadmaps.)

C12.3

(C12.3) Does your organization engage in activities that could either directly or indirectly influence policy, law, or regulation that may impact the climate?

Row 1

Direct or indirect engagement that could influence policy, law, or regulation that may impact the climate

Yes, we engage directly with policy makers
Yes, we engage indirectly through trade associations

Does your organization have a public commitment or position statement to conduct your engagement activities in line with the goals of the Paris Agreement?

Yes

Attach commitment or position statement(s)

<https://www.unitedforparisagreement.com/> <https://www.gstatic.com/gumdrop/sustainability/carbon-free-by-2030.pdf>
carbon-free-by-2030 (1).pdf

Describe the process(es) your organization has in place to ensure that your engagement activities 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.

Primary reason for not engaging in activities that could directly or indirectly influence policy, law, or regulation that may impact the climate

<Not Applicable>

Explain why your organization does not engage in activities that could directly or indirectly influence policy, law, or regulation that may impact the climate

<Not Applicable>

C12.3a

(C12.3a) On what policy, law, or regulation that may impact the climate has your organization been engaging directly with policy makers in the reporting year?

Focus of policy, law, or regulation that may impact the climate

Circular economy
Climate-related targets
Electricity grid access for renewables
Energy attribute certificate systems
Mandatory climate-related reporting
Renewable energy generation
Subsidies for renewable energy projects

Specify the policy, law, or regulation on which your organization is engaging with policy makers

Corporate commitments for carbon-free energy are helping scale up clean energy across America, and we're seeing hundreds of companies take action. Federal procurement can also have a significant impact on clean energy deployment. We worked with key partners to encourage the federal government to adopt a 24/7 CFE goal, which they did as part of the Federal Sustainability Plan. Outside of the U.S., we helped launch the 24/7 Carbon-free Energy Compact with SE4ALL and UN Energy to advance 24/7 CFE across the globe. But for us and other companies to realize this future, we need to galvanize investment and modernization of our energy infrastructure. It's for this reason that we have supported strong climate policies like clean energy standards and renewable energy tax incentives, which have helped enable clean electricity generation to grow dramatically in dozens of states. And it's why we support the clean energy and climate provisions in the bipartisan infrastructure and budget reconciliation packages. These provisions provide the funding and supportive regulatory climate to promote important investments in clean energy that help the U.S. move toward a cleaner and greener energy system, putting the vision of carbon-free operations within reach.

Policy, law, or regulation geographic coverage

National

Country/region the policy, law, or regulation applies to

United States of America

Your organization's position on the policy, law, or regulation

Support with minor exceptions

Description of engagement with policy makers

We've encouraged the U.S. government to adopt a 24/7 carbon-free energy goal for federal facilities and helped launch the 24/7 Carbon-free Energy Compact with SE4ALL and UN Energy. For more information, see <https://www.catf.us/wp-content/uploads/2021/03/Federal-Higher-Impact-Carbon-Free-Electricity-Procurement-Coalition-Letter.pdf> and <https://www.seforall.org/press-releases/seforall-and-google-to-launch-new-compact>

Details of exceptions (if applicable) and your organization's proposed alternative approach to the policy, law or regulation

We support the clean energy and climate provisions in the bipartisan infrastructure and budget reconciliation packages.

Have you evaluated whether your organization's engagement is aligned with the goals of the Paris Agreement?

Yes, we have evaluated, and it is aligned

C12.3b

(C12.3b) Provide details of the trade associations your organization engages with which are likely to take a position on any policy, law or regulation that may impact the climate.

Trade association

Other, please specify (American Council on Renewable Energy (ACORE))

Is your organization's position on climate change consistent with theirs?

Consistent

Has your organization influenced, or is your organization attempting to influence their position?

We publicly promote their current position

State the trade association's position on climate change, explain where your organization's position differs, and how you are attempting to influence their position (if applicable)

American Council on Renewable Energy (ACORE) is a 501(c)(3) national nonprofit organization that unites finance, policy and technology to accelerate the transition to a renewable energy economy. ACORE is the focal point for collaborative advocacy across the renewable energy sector. ACORE studies focus on the most significant climate policy options and their impact on renewable energy growth and investment. In an effort to identify the most promising and effective suite of climate policies, their work includes analyses of carbon pricing scenarios, a federal high-penetration renewable energy standard, a technology-neutral tax credit, and complementary measures to ready the electric grid for the higher levels of renewable energy penetration necessary to achieve ambitious greenhouse gas emission reductions. For more information, see <http://www.acore.org/> Google is part of many trade associations and has chosen to highlight a select few that are specifically focused on climate and energy issues. We are not on the Board of this trade association and do not provide funding beyond membership. However, we are founding members of the U.S. Partnership for Renewable Energy Finance (US PREF), which is now part of ACORE. We are also a member of the Partnership for Renewable Integration & Market Expansion (PRIME) (<https://acore.org/pref-and-prime/>) and serve on the Leadership Council. We maintain regular engagement with top leadership of the key trade associations in which we are members.

Funding figure your organization provided to this trade association in the reporting year, if applicable (currency as selected in C0.4) (optional)

Describe the aim of your organization's funding

<Not Applicable>

Have you evaluated whether your organization's engagement with this trade association is aligned with the goals of the Paris Agreement?

Yes, we have evaluated, and it is aligned

Trade association

Other, please specify (RE100)

Is your organization's position on climate change consistent with theirs?

Consistent

Has your organization influenced, or is your organization attempting to influence their position?

We publicly promote their current position

State the trade association's position on climate change, explain where your organization's position differs, and how you are attempting to influence their position (if applicable)

RE100 is a global corporate renewable energy initiative bringing together hundreds of large and ambitious businesses committed to 100% renewable electricity. Led by the Climate Group and in partnership with CDP, their mission is to accelerate change towards zero carbon grids at scale. For more information, see <http://there100.org/> Google is part of many trade associations and has chosen to highlight a select few that are specifically focused on climate and energy issues. Google joined RE100 in December 2015 (see: <https://www.there100.org/our-work/news/google-joins-re100-and-announces-new-investments-wind-and-solar-power-news>). Google is on the Advisory Committee of RE100, which advises RE100 leadership on issues related to strategy and policy engagement. We do not provide funding beyond membership.

Funding figure your organization provided to this trade association in the reporting year, if applicable (currency as selected in C0.4) (optional)

Describe the aim of your organization's funding

<Not Applicable>

Have you evaluated whether your organization's engagement with this trade association is aligned with the goals of the Paris Agreement?

Yes, we have evaluated, and it is aligned

Trade association

Other, please specify (North Carolina Sustainable Energy Association (NCSEA))

Is your organization's position on climate change consistent with theirs?

Consistent

Has your organization influenced, or is your organization attempting to influence their position?

We publicly promote their current position

State the trade association's position on climate change, explain where your organization's position differs, and how you are attempting to influence their position (if applicable)

North Carolina Sustainable Energy Association (NCSEA) works to enable clean energy jobs, economic opportunities, and affordable energy options for North Carolinians. For more information, see <http://www.energync.org/> Google is part of many trade associations and has chosen to highlight a select few that are specifically focused on climate and energy issues. We are not on the Board of this trade association and do not provide funding beyond membership. However, we maintain regular engagement with top leadership of the key trade associations in which we are members.

Funding figure your organization provided to this trade association in the reporting year, if applicable (currency as selected in C0.4) (optional)

Describe the aim of your organization's funding

<Not Applicable>

Have you evaluated whether your organization's engagement with this trade association is aligned with the goals of the Paris Agreement?

Yes, we have evaluated, and it is aligned

Trade association

Other, please specify (Carolinas Clean Energy Business Association (CCEBA))

Is your organization's position on climate change consistent with theirs?

Consistent

Has your organization influenced, or is your organization attempting to influence their position?

We publicly promote their current position

State the trade association's position on climate change, explain where your organization's position differs, and how you are attempting to influence their position (if applicable)

The Carolinas Clean Energy Business Association (CCEBA) is a 501(c)(6) non-profit trade association for North and South Carolina's clean energy industry. CCEBA represents businesses throughout the clean energy sector, including independent power producers/developers as well as those in the clean energy supply chain. These include manufacturing, engineering, construction, financial and legal services, as well as businesses who want to purchase clean energy. For more information, see <https://carolinasceba.com/> Google is part of many trade associations and has chosen to highlight a select few that are specifically focused on climate and energy issues. Google is on the Board of CCEBA and chairs the CCEBA legislative committee, but does not provide any funding beyond membership.

Funding figure your organization provided to this trade association in the reporting year, if applicable (currency as selected in C0.4) (optional)

Describe the aim of your organization's funding

<Not Applicable>

Have you evaluated whether your organization's engagement with this trade association is aligned with the goals of the Paris Agreement?

Yes, we have evaluated, and it is aligned

Trade association

Other, please specify (Advanced Power Alliance)

Is your organization's position on climate change consistent with theirs?

Consistent

Has your organization influenced, or is your organization attempting to influence their position?

We publicly promote their current position

State the trade association's position on climate change, explain where your organization's position differs, and how you are attempting to influence their position (if applicable)

The Advanced Power Alliance is the industry trade association created to promote the development of wind, solar and energy storage as resources that can deliver clean, reliable, affordable power for American consumers. For more information, see <https://poweralliance.org/> Google is part of many trade associations and has chosen to highlight a select few that are specifically focused on climate and energy issues. We are Board Members of the Advanced Power Alliance, but do not provide any funding beyond membership. We participate principally to support clean energy advocacy in the states, Oklahoma and Texas. And, we also participate actively in the group's engagement in ERCOT and SPP.

Funding figure your organization provided to this trade association in the reporting year, if applicable (currency as selected in C0.4) (optional)

Describe the aim of your organization's funding

<Not Applicable>

Have you evaluated whether your organization's engagement with this trade association is aligned with the goals of the Paris Agreement?

Yes, we have evaluated, and it is aligned

Trade association

Other, please specify (Advanced Energy Buyers Group)

Is your organization's position on climate change consistent with theirs?

Consistent

Has your organization influenced, or is your organization attempting to influence their position?

We publicly promote their current position

State the trade association's position on climate change, explain where your organization's position differs, and how you are attempting to influence their position (if applicable)

The Advanced Energy Buyers Group is a coalition of leading advanced energy purchasers, engaging on policies to unlock opportunities for customers to access affordable, reliable, clean, and innovative energy options. For more information, see <https://www.advancedenergybuyersgroup.org/> Google is part of many trade associations and has chosen to highlight a select few that are specifically focused on climate and energy issues. Google joined this group in 2017, when it was formed. We are not on the Board of this trade association and do not provide funding beyond membership. However, we maintain regular engagement with top leadership of the key trade associations in which we are members.

Funding figure your organization provided to this trade association in the reporting year, if applicable (currency as selected in C0.4) (optional)

Describe the aim of your organization's funding

<Not Applicable>

Have you evaluated whether your organization's engagement with this trade association is aligned with the goals of the Paris Agreement?

Yes, we have evaluated, and it is aligned

Trade association

WindEurope

Is your organization's position on climate change consistent with theirs?

Consistent

Has your organization influenced, or is your organization attempting to influence their position?

We publicly promote their current position

State the trade association's position on climate change, explain where your organization's position differs, and how you are attempting to influence their position (if applicable)

WindEurope is the voice of the wind industry, actively promoting wind energy across Europe. They have over 400 members from across the whole value chain of wind energy: wind turbine manufacturers, component suppliers, power utilities and wind farm developers, financial institutions, research institutes and national wind energy associations. WindEurope believes that a rapid renewables-based electrification is the most cost-effective way to decarbonise our economy and reach climate neutrality by 2050. For more information, see <https://windeurope.org/> Google is part of many trade associations and has chosen to highlight a select few that are specifically focused on climate and energy issues. Google joined this group in 2018. We are not on the Board of this trade association and do not provide funding beyond membership. However, we maintain regular engagement with top leadership of the key trade associations in which we are members.

Funding figure your organization provided to this trade association in the reporting year, if applicable (currency as selected in C0.4) (optional)

Describe the aim of your organization's funding

<Not Applicable>

Have you evaluated whether your organization's engagement with this trade association is aligned with the goals of the Paris Agreement?

Yes, we have evaluated, and it is aligned

Trade association

SolarPower Europe

Is your organization's position on climate change consistent with theirs?

Consistent

Has your organization influenced, or is your organization attempting to influence their position?

We publicly promote their current position

State the trade association's position on climate change, explain where your organization's position differs, and how you are attempting to influence their position (if applicable)

SolarPower Europe's mission is to ensure solar becomes Europe's leading energy source by 2030. As the member-led association for the European solar PV sector, SolarPower Europe represents over 260 organizations across the entire solar sector. With solar sitting on the horizon of unprecedented expansion, SolarPower Europe works together with members to create the right regulatory and business environment to take solar to the next level. For more information, see <http://www.solarpowereurope.org/> Google is part of many trade associations and has chosen to highlight a select few that are specifically focused on climate and energy issues. Google joined this group in 2018. We are not on the Board of this trade association and do not provide funding beyond membership. However, we maintain regular engagement with top leadership of the key trade associations in which we are members.

Funding figure your organization provided to this trade association in the reporting year, if applicable (currency as selected in C0.4) (optional)

Describe the aim of your organization's funding

<Not Applicable>

Have you evaluated whether your organization's engagement with this trade association is aligned with the goals of the Paris Agreement?

Yes, we have evaluated, and it is aligned

Trade association

Other, please specify (RE-Source)

Is your organization's position on climate change consistent with theirs?

Consistent

Has your organization influenced, or is your organization attempting to influence their position?

We publicly promote their current position

State the trade association's position on climate change, explain where your organization's position differs, and how you are attempting to influence their position (if applicable)

The RE-Source Platform is Europe's leading forum for corporate renewable energy sourcing. Through its wide-ranging and innovative Buyers Toolkit and popular annual event for energy buyers and sellers, RE-Source seeks to remove barriers for corporates to renewable energy procurement in support of Europe's climate and energy goals. The RE-Source Platform pushes for the removal of regulatory and administrative barriers to corporate renewable energy procurement in Europe in support of the EU's climate and energy goals. The Platform provides a wealth of free information and resources on corporate energy sourcing, including an annual event which brings together both buyers and sellers from across Europe. For more information, see <http://resource-platform.eu/> Google is part of many trade associations and has chosen to highlight a select few that are specifically focused on climate and energy issues. Google was actively involved in the creation of the RE-Source Platform and is one of its founding Strategic Partners and a member of the Steering Group. Google also sponsored the annual RE-Source conference in Amsterdam in 2019, which brought together over 800 government officials and business leaders dedicated to accelerating corporate purchasing of renewable energy in Europe.

Funding figure your organization provided to this trade association in the reporting year, if applicable (currency as selected in C0.4) (optional)

Describe the aim of your organization's funding

<Not Applicable>

Have you evaluated whether your organization's engagement with this trade association is aligned with the goals of the Paris Agreement?

Yes, we have evaluated, and it is aligned

Trade association

Other, please specify (Clean Energy Buyers Alliance (CEBA))

Is your organization's position on climate change consistent with theirs?

Consistent

Has your organization influenced, or is your organization attempting to influence their position?

We publicly promote their current position

State the trade association's position on climate change, explain where your organization's position differs, and how you are attempting to influence their position (if applicable)

CEBA is a membership association for energy customers seeking to procure clean energy across the U.S. Today, their membership of over 300 includes stakeholders from across the commercial and industrial sector, non-profit organizations, as well as energy providers and service providers. The Clean Energy Buyers Association's aspiration is to achieve a 90% carbon-free U.S. electricity system by 2030 and to cultivate a global community of energy customers driving clean energy. For more information, see <https://cebayers.org/> Google is part of many trade associations and has chosen to highlight a select few that are specifically focused on climate and energy issues. Google was actively involved in the creation of this national trade organization in 2018, serving as the chair of the Interim Board of Directors during the transition from an NGO-led effort into a corporate-led trade organization. Google also provided financial support for the development of the organization. In 2020, a Google representative served as the Board Chair of this organization

Funding figure your organization provided to this trade association in the reporting year, if applicable (currency as selected in C0.4) (optional)

Describe the aim of your organization's funding

<Not Applicable>

Have you evaluated whether your organization's engagement with this trade association is aligned with the goals of the Paris Agreement?

Yes, we have evaluated, and it is aligned

Trade association

Other, please specify (American Clean Power Association (ACPA))

Is your organization's position on climate change consistent with theirs?

Consistent

Has your organization influenced, or is your organization attempting to influence their position?

We publicly promote their current position

State the trade association's position on climate change, explain where your organization's position differs, and how you are attempting to influence their position (if applicable)

The American Clean Power Association (ACPA) is the voice of companies from across the clean power sector that are powering America's future and providing cost-effective solutions to the climate crisis while creating jobs, spurring massive investment in the U.S. economy, and driving high-tech innovation across the nation. ACP gives a voice to the renewable power sector to speak at a time when renewable investments can help rebuild our economy and address climate change. For more information, see <https://www.cleanpower.org> Google is part of many trade associations and has chosen to highlight a select few that are specifically focused on climate and energy issues. This group (formerly the American Wind Energy Association) was created in 2020 to advance all renewable energy technologies in markets across the United States. Google joined in 2020 and was a founding member of this organization. We do not provide funding beyond membership. We maintain regular engagement with top leadership of the key trade associations in which we are members.

Funding figure your organization provided to this trade association in the reporting year, if applicable (currency as selected in C0.4) (optional)

Describe the aim of your organization's funding

<Not Applicable>

Have you evaluated whether your organization's engagement with this trade association is aligned with the goals of the Paris Agreement?

Yes, we have evaluated, and it is aligned

Trade association

Other, please specify (Japan Climate Leaders Partnership)

Is your organization's position on climate change consistent with theirs?

Consistent

Has your organization influenced, or is your organization attempting to influence their position?

We publicly promote their current position

State the trade association's position on climate change, explain where your organization's position differs, and how you are attempting to influence their position (if applicable)

Japan Climate Leaders Partnership (JCLP) is a coalition of Japanese companies who hold the firm belief that economic prosperity and sustainability go hand in hand. For more information, see <https://japan-clp.jp/en> Google is part of many trade associations and has chosen to highlight a select few that are specifically focused on climate and energy issues. Google joined this group in 2020. We are not on the Board of this trade association and do not provide funding beyond membership. However, we maintain regular engagement with top leadership of the key trade associations in which we are members.

Funding figure your organization provided to this trade association in the reporting year, if applicable (currency as selected in C0.4) (optional)

Describe the aim of your organization's funding

<Not Applicable>

Have you evaluated whether your organization's engagement with this trade association is aligned with the goals of the Paris Agreement?

Yes, we have evaluated, and it is aligned

Trade association

Advanced Energy Economy (AEE)

Is your organization's position on climate change consistent with theirs?

Consistent

Has your organization influenced, or is your organization attempting to influence their position?

We publicly promote their current position

State the trade association's position on climate change, explain where your organization's position differs, and how you are attempting to influence their position (if applicable)

Advanced Energy Economy (AEE) is a national association of businesses that are making the energy we use secure, clean, and affordable. They work to accelerate the move to 100% clean energy and electrified transportation in the U.S. Advanced energy encompasses a broad range of products and services that constitute the best available technologies for meeting energy needs today and tomorrow. These include energy efficiency, demand response, energy storage, solar, wind, hydro, nuclear, electric vehicles, biofuels and smart grid. AEE represents more than 100 companies in the \$238 billion U.S. advanced energy industry, which employs 3.2 million U.S. workers. For more information, see <https://www.aee.net/> Google is part of many trade associations and has chosen to highlight a select few that are specifically focused on climate and energy issues. Google joined this group in 2019. We are not on the Board of this trade association and do not provide funding beyond membership. However, we maintain regular engagement with top leadership of the key trade associations in which we are members.

Funding figure your organization provided to this trade association in the reporting year, if applicable (currency as selected in C0.4) (optional)

Describe the aim of your organization's funding

<Not Applicable>

Have you evaluated whether your organization's engagement with this trade association is aligned with the goals of the Paris Agreement?

Yes, we have evaluated, and it is aligned

Trade association

Other, please specify (Renewable Northwest)

Is your organization's position on climate change consistent with theirs?

Consistent

Has your organization influenced, or is your organization attempting to influence their position?

We publicly promote their current position

State the trade association's position on climate change, explain where your organization's position differs, and how you are attempting to influence their position (if applicable)

Renewable Northwest is a renewable energy advocacy organization. With a granular focus on policy and regulatory proceedings in Oregon, Washington, Idaho and Montana, they are relentless in their effort to ensure transparent, efficient and competitive markets for renewable energy across the Western US. For more information, see <https://renewablenw.org/> Google is part of many trade associations and has chosen to highlight a select few that are specifically focused on climate and energy issues. Google joined this group in 2019. We are not on the Board of this trade association and do not provide funding beyond membership. However, we maintain regular engagement with top leadership of the key trade associations in which we are members.

Funding figure your organization provided to this trade association in the reporting year, if applicable (currency as selected in C0.4) (optional)

Describe the aim of your organization's funding

<Not Applicable>

Have you evaluated whether your organization's engagement with this trade association is aligned with the goals of the Paris Agreement?

Yes, we have evaluated, and it is aligned

Trade association

Other, please specify (Americans for a Clean Energy Grid)

Is your organization's position on climate change consistent with theirs?

Consistent

Has your organization influenced, or is your organization attempting to influence their position?

We publicly promote their current position

State the trade association's position on climate change, explain where your organization's position differs, and how you are attempting to influence their position (if applicable)

Americans for a Clean Energy Grid (ACEG) is the only non-profit broad-based public interest advocacy coalition focused on the need to expand, integrate, and modernize the North American high-voltage grid. Expanded high-voltage transmission will make America's electric grid more affordable, reliable, and sustainable and allow America to tap all economic energy resources, overcome system management challenges, and create thousands of well-compensated jobs. But an insular, outdated and often short-sighted regional transmission planning and permitting system stands in the way of achieving those goals. ACEG brings together the diverse support for an expanded and modernized grid from business, labor, consumer and environmental groups, and other transmission supporters to educate policymakers and key opinion leaders to support policy which recognizes the benefits of a robust transmission grid. ACEG is a 501(c)(3) organization. For more information, see: <https://cleanenergygrid.org> Google is part of many trade associations and has chosen to highlight a select few that are specifically focused on climate and energy issues. Google joined this group in 2019. We are not on the Board of this trade association and do not provide funding beyond membership. However, we maintain regular engagement with top leadership of the key trade associations in which we are members.

Funding figure your organization provided to this trade association in the reporting year, if applicable (currency as selected in C0.4) (optional)

Describe the aim of your organization's funding

<Not Applicable>

Have you evaluated whether your organization's engagement with this trade association is aligned with the goals of the Paris Agreement?

Yes, we have evaluated, and it is aligned

Trade association

Other, please specify (Smart Electric Power Alliance (SEPA))

Is your organization's position on climate change consistent with theirs?

Consistent

Has your organization influenced, or is your organization attempting to influence their position?

We publicly promote their current position

State the trade association's position on climate change, explain where your organization's position differs, and how you are attempting to influence their position (if applicable)

The Smart Electric Power Alliance (SEPA) is a nonprofit organization that envisions a carbon-free energy system that is safe, affordable, reliable, resilient and equitable. For more information, see: <https://sepapower.org/> Google is part of many trade associations and has chosen to highlight a select few that are specifically focused on climate and energy issues. Google joined this group in 2019. We are not on the Board of this trade association and do not provide funding beyond membership. However, we maintain regular engagement with top leadership of the key trade associations in which we are members.

Funding figure your organization provided to this trade association in the reporting year, if applicable (currency as selected in C0.4) (optional)

Describe the aim of your organization's funding

<Not Applicable>

Have you evaluated whether your organization's engagement with this trade association is aligned with the goals of the Paris Agreement?

Yes, we have evaluated, and it is aligned

Trade association

Other, please specify (Energy Alabama)

Is your organization's position on climate change consistent with theirs?

Consistent

Has your organization influenced, or is your organization attempting to influence their position?

We publicly promote their current position

State the trade association's position on climate change, explain where your organization's position differs, and how you are attempting to influence their position (if applicable)

Energy Alabama advances sustainable energy in the community by advocating for better policy. They work on behalf of their members with cities, counties, utilities, and the state of Alabama. For more information, see: <https://alcse.org/> Google is part of many trade associations and has chosen to highlight a select few that are specifically focused on climate and energy issues. Google joined this group in 2019. We are not on the Board of this trade association and do not provide funding beyond membership. However, we maintain regular engagement with top leadership of the key trade associations in which we are members.

Funding figure your organization provided to this trade association in the reporting year, if applicable (currency as selected in C0.4) (optional)

Describe the aim of your organization's funding

<Not Applicable>

Have you evaluated whether your organization's engagement with this trade association is aligned with the goals of the Paris Agreement?

Yes, we have evaluated, and it is aligned

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 other regulatory filings

Status

Complete

Attach the document

google2021eunfrdreport.pdf

Page/Section reference

Pages 2 to 4

Content elements

Governance

Strategy

Risks & opportunities

Other metrics

Comment

See Google's 2022 European Union Non-Financial Reporting Directive (NFRD) Report

Publication

In mainstream reports

Status

Complete

Attach the document

2021alphabetannualreport.pdf

Page/Section reference

Ongoing Commitment to Sustainability (Page 8), Risk Factors (Page 12, 13 and 17)

Content elements

Strategy
Risks & opportunities
Other metrics

Comment

See Page 8 of Alphabet's FY2021 10-K

Publication

In mainstream reports

Status

Complete

Attach the document

2022_alphabet_proxy_statement.pdf

Page/Section reference

Letter from the Chair of the Board of Directors (Page 4), Environmental & Social Highlights (Page 13), and company responses to certain climate change-related Stockholder Proposals (starting on page 67)

Content elements

Strategy
Risks & opportunities
Other metrics

Comment

See Alphabet's 2022 Proxy Statement

Publication

In voluntary sustainability report

Status

Complete

Attach the document

google-2022-environmental-report.pdf

Page/Section reference

Pages 1 to 17

Content elements

Governance
Strategy
Risks & opportunities
Emissions figures
Emission targets
Other metrics

Comment

See Google's 2022 Environmental Report

Publication

In voluntary communications

Status

Complete

Attach the document

carbon-free-by-2030 (1).pdf

Page/Section reference

Pages 1 to 25

Content elements

Strategy
Risks & opportunities
Other metrics

Comment

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

Publication

In voluntary communications

Status

Complete

Attach the document

247-carbon-free-energy.pdf

Page/Section reference

Pages 1 to 21

Content elements

Strategy
Risks & opportunities
Other metrics

Comment

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

Publication

In voluntary sustainability report

Status

Underway – previous year attached

Attach the document

google-2021-supplier-responsibility-report.pdf

Page/Section reference

Pages 1 to 43

Content elements

Governance
Strategy
Risks & opportunities
Emissions figures
Emission targets
Other metrics

Comment

See Google's 2021 Supplier Responsibility Report

Publication

In voluntary communications

Status

Complete

Attach the document

circular-google.pdf

Page/Section reference

Pages 1 to 15

Content elements

Strategy
Risks & opportunities
Other metrics

Comment

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

Publication

In voluntary communications

Status

Complete

Attach the document

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

Page/Section reference

Pages 1 to 27

Content elements

Strategy
Risks & opportunities
Other metrics

Comment

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

Publication

In voluntary communications

Status

Complete

Attach the document

2018-Ecology-Book.pdf

Page/Section reference

Content elements

- Strategy
- Risks & opportunities
- Other metrics

Comment

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

Publication

In voluntary communications

Status

Complete

Attach the document

10-years-carbon-neutrality.pdf

Page/Section reference

Pages 1 to 3

Content elements

- Strategy
- Risks & opportunities
- Other metrics

Comment

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

Publication

In voluntary communications

Status

Complete

Attach the document

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

Page/Section reference

Pages 1 to 13

Content elements

- Strategy
- Risks & opportunities
- Other metrics

Comment

See Google's "Achieving Our 100% Renewable Energy Purchasing Goal and Going Beyond" white paper

C15. Biodiversity

C15.1

(C15.1) Is there board-level oversight and/or executive management-level responsibility for biodiversity-related issues within your organization?

	Board-level oversight and/or executive management-level responsibility for biodiversity-related issues	Description of oversight and objectives relating to biodiversity	Scope of board-level oversight
Row 1	Please select	<Not Applicable>	<Not Applicable>

C15.2

(C15.2) Has your organization made a public commitment and/or endorsed any initiatives related to biodiversity?

	Indicate whether your organization made a public commitment or endorsed any initiatives related to biodiversity	Biodiversity-related public commitments	Initiatives endorsed
Row 1	Yes, we have made public commitments and publicly endorsed initiatives related to biodiversity	Other, please specify (We're building on the state of California's conservation efforts with \$1 million to help restore and enhance an additional 600 acres of habitat for monarchs and other pollinators across California, including creating more habitat on our own campuses)	Other, please specify (Santa Clara Valley Audubon Society, San Francisco Estuary Institute (SFEI), Global Fishing Watch, Global Forest Watch, REWS public-facing urban ecology research and innovation, Wildlife Insights, Urban Canopy Explorer)

C15.3

(C15.3) Does your organization assess the impact of its value chain on biodiversity?

	Does your organization assess the impact of its value chain on biodiversity?	Portfolio
Row 1	Please select	<Not Applicable>

C15.4

(C15.4) What actions has your organization taken in the reporting year to progress your biodiversity-related commitments?

	Have you taken any actions in the reporting period to progress your biodiversity-related commitments?	Type of action taken to progress biodiversity- related commitments
Row 1	Yes, we are taking actions to progress our biodiversity-related commitments	Species management

C15.5

(C15.5) Does your organization use biodiversity indicators to monitor performance across its activities?

	Does your organization use indicators to monitor biodiversity performance?	Indicators used to monitor biodiversity performance
Row 1	Yes, we use indicators	State and benefit indicators Response indicators

C15.6

(C15.6) Have you published information about your organization's response to biodiversity-related issues for this reporting year in places other than in your CDP response? If so, please attach the publication(s).

Report type	Content elements	Attach the document and indicate where in the document the relevant biodiversity information is located
In voluntary sustainability report or other voluntary communications	Details on biodiversity indicators	https://sustainability.google/progress/projects/wildlife-insights/
In voluntary sustainability report or other voluntary communications	Details on biodiversity indicators	https://blog.google/outreach-initiatives/sustainability/restor-helps-anyone-be-part-ecological-restoration/amp/
In voluntary sustainability report or other voluntary communications	Content of biodiversity-related policies or commitments	https://www.blog.google/outreach-initiatives/sustainability/monarch-butterflies-california/

C16. Signoff

C-FI

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

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

OVERALL SUSTAINABILITY STRATEGY

Google Sustainability website

<https://sustainability.google>

Google Sustainability blog

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

Google Environmental Report

<https://www.gstatic.com/gumdrop/sustainability/google-2022-environmental-report.pdf>

2021 blog post: Bringing COP26 to people everywhere

<https://blog.google/outreach-initiatives/sustainability/google-cop26-2021/>

2021 blog post: We support comprehensive climate and clean energy policy

<https://blog.google/outreach-initiatives/public-policy/we-support-comprehensive-climate-and-clean-energy-policy/>

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

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

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

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

2019 blog post: Steps towards a more sustainable future

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

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

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

ENERGY EFFICIENCY

Google Data Centers website: Efficiency: How We Do It

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

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

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

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

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

CARBON-FREE ENERGY

Google Energy Progress Website

<https://sustainability.google/progress/energy/>

Carbon Free by 2030 White Paper

<https://www.gstatic.com/gumdrop/sustainability/carbon-free-by-2030.pdf>

24/7 Carbon Free Energy White Paper

<https://www.gstatic.com/gumdrop/sustainability/247-carbon-free-energy.pdf>

A Policy Roadmap for 24/7 Carbon-Free Energy

<https://www.gstatic.com/gumdrop/sustainability/policy-roadmap-carbon-free-energy.pdf>

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

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

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

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

Spotlight: Greening the Grid: How Google Buys Renewable Energy

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

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

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

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

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

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

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

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

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

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

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

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

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

2019 case study: Accelerating Renewable Energy Purchasing through Auctions

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

Achieving 100% Renewable Energy Goal - 2016 White Paper

<https://static.googleusercontent.com/media/www.google.com/en/green/pdf/achieving-100-renewable-energy-purchasing-goal.pdf>

OUR CARBON FOOTPRINT

Spotlight: Capturing Value from Waste in Upstate New York

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

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

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

2017 white paper: 10 Years of Carbon Neutrality

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

CLIMATE RESILIENCE

2018 case study: Seeding Resilience with Ecology

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

HOW WE HELP USERS & CUSTOMERS BECOME MORE EFFICIENT

2021 blog post: Giving you more sustainable choices with Google

<https://blog.google/outreach-initiatives/sustainability/sustainability-2021/>

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

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

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

Google Maps Transit Information

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

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

http://static.googleusercontent.com/external_content/untrusted_dlcp/www.google.com/en/us/green/pdfs/google-green-computing.pdf

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>

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

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

CIRCULARITY

Google Circular Economy Website

<https://sustainability.google/commitments/circular-economy/#>

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

Supplier Responsibility 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/>

C16.1

(C16.1) 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	257637000000

SC1.1

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

SC1.2

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

SC1.3

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

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

SC1.4

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

SC2.1

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

SC2.2

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

SC4.1

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

Submit your response

In which language are you submitting your response?

English

Please confirm how your response should be handled by CDP

	I understand that my response will be shared with all requesting stakeholders	Response permission
Please select your submission options	Yes	Public

Please confirm below

I have read and accept the applicable Terms