Climate Change 2016 Information Request
Alphabet, Inc.

Module: Introduction

Page: Introduction

CC0.1
Introduction
Please give a general description and introduction to your organization.

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." As part of that, they also explained that you could expect us to make "smaller bets in areas that might seem very speculative or even strange when compared to our current businesses." From the start, the company has always strived to do more, and to do important and meaningful things with the resources we have.

To help accelerate this, we announced plans in August 2015 to create a new public holding company, called Alphabet. In October 2015, we implemented the holding company reorganization, which resulted in Alphabet becoming the successor issuer to Google and Google becoming a wholly owned subsidiary of Alphabet. Our two classes of shares continue to trade on Nasdaq as GOOGL and GOOG.

Alphabet is a collection of businesses -- the largest of which, of course, is Google. It also includes businesses that we combine as Other Bets and generally are pretty far afield of our main Internet products such as Verily, Calico, X, Nest, GV, Google Capital and Access/Google Fiber. Our Alphabet structure is about helping businesses within Alphabet prosper through strong leaders and independence.

Our largest subsidiary, Google's mission is to organize the world's information and make it universally accessible and useful. As its founders explained in their first letter to shareholders, Google's goal is to: "... develop services that significantly improve the lives of as many people as possible." We believe in the potential for technology to create positive impact in the world.

At Google, our innovations in search and advertising have made our website widely used and our brand one of the most recognized in the world. We generate revenues primarily by delivering online advertising that consumers find relevant and that advertisers find cost-effective. Google's core products such as Search, Android, Maps, Chrome, YouTube, Google Play and Gmail each have over one billion monthly active users. And we believe we are just beginning
to scratch the surface. Google's vision is to remain a place of incredible creativity and innovation that uses our technical expertise to tackle big problems. Our Other Bets are also making important strides in their industries, and our goal is for them to become thriving, successful businesses in the long term.

Google was incorporated in California in September 1998 and reincorporated in the State of Delaware in August 2003. Alphabet was incorporated in the State of Delaware in August 2015. As of December 31, 2015, we had almost $75 billion in total revenues and 61,814 full-time employees. Our headquarters are located in Mountain View, California, where we own approximately 4.8 million square feet of office and building space and approximately fifteen acres of developable land to accommodate anticipated future growth. In addition, we own and lease office and building space, research and development, and sales and support offices primarily in North America, Europe, South America, and Asia. We operate and own data centers in the U.S., Europe, South America, and Asia pursuant to various lease agreements and co-location arrangements.

As used herein, "our company," "we," "us," "our," and similar terms refer collectively to Alphabet Inc. and Google Inc., together with their subsidiaries, unless the context indicates otherwise.

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

Any financial projections provided as examples in Alphabet's responses to this Questionnaire are for illustrative purposes only and are based upon certain hypothetical assumptions that are subject to change. They do not constitute any undertaking, representation or guarantee of any nature.

CC0.2
Reporting Year
Please state the start and end date of the year for which you are reporting data.
The current reporting year is the latest/most recent 12-month period for which data is reported. Enter the dates of this year first.
We request data for more than one reporting period for some emission accounting questions. Please provide data for the three years prior to the current reporting year if you have not provided this information before, or if this is the first time you have answered a CDP information request. (This does not apply if you have been offered and selected the option of answering the shorter questionnaire). If you are going to provide additional years of data, please give the dates of those reporting periods here. Work backwards from the most recent reporting year.
Please enter dates in following format: day(DD)/month(MM)/year(YYYY) (i.e. 31/01/2001).

Enter Periods that will be disclosed
Thu 01 Jan 2015 - Thu 31 Dec 2015

CC0.3
Country list configuration

Please select the countries for which you will be supplying data. If you are responding to the Electric Utilities module, this selection will be carried forward to assist you in completing your response.

Select country
United States of America
Rest of world

CC0.4
Currency selection

Please select the currency in which you would like to submit your response. All financial information contained in the response should be in this currency.

USD($)

CC0.6
Modules
As part of the request for information on behalf of investors, electric utilities, companies with electric utility activities or assets, companies in the automobile or auto component manufacture sub-industries, companies in the oil and gas sub-industries, companies in the information technology and telecommunications sectors and companies in the food, beverage and tobacco industry group should complete supplementary questions in addition to the main questionnaire.
If you are in these sector groupings (according to the Global Industry Classification Standard (GICS)), the corresponding sector modules will not appear below but will automatically appear in the navigation bar when you save this page. If you want to query your classification, please email respond@cdp.net.
If you have not been presented with a sector module that you consider would be appropriate for your company to answer, please select the module below. If you wish to view the questions first, please see https://www.cdp.net/en-US/Programmes/Pages/More-questionnaires.aspx.

Further Information

Module: Management

Page: CC1. Governance

CC1.1
Where is the highest level of direct responsibility for climate change within your organization?

Senior Manager/Officer

CC1.1a
Please identify the position of the individual or name of the committee with this responsibility

The highest level of direct responsibility for climate change rests with Google's Senior Vice President of Technical Infrastructure (a senior manager -- referred to internally as a Senior VP), who runs Google's data center operations. As data center electricity is the vast majority of Alphabet's carbon footprint, responsibility for measuring & offsetting our carbon footprint rests with this senior executive. This Senior VP reports directly to Google's Senior VP of Enterprise, who leads all of Google's cloud businesses including Google for Work, Google Apps, Google Cloud Platform, Google Maps and Google for Education, and in turn reports to Sundar Pichai, Google's CEO.

CC1.2
Do you provide incentives for the management of climate change issues, including the attainment of targets?

Yes

CC1.2a
Please provide further details on the incentives provided for the management of climate change issues

Who is entitled to benefit from these incentives?	The type of incentives	Incentivized performance indicator	Comment
Other:	Monetary reward	Other: Performance bonus tied to meeting targets related to reduced energy use.	Through quarterly individual- and team-level target-setting, regular performance reviews, and bonus programs, performance for many employees is tied to meeting targets related to energy efficiency, reduced energy use, and increased renewable energy procurement.
Energy managers	Monetary reward	Energy reduction project Efficiency project Other: Performance bonus tied to meeting targets related to reduced energy use, reduced energy spend, and increased renewable energy procurement.	Through quarterly individual- and team-level target-setting, regular performance reviews, and bonus programs, performance for many employees is tied to meeting targets related to energy efficiency, reduced energy use, and increased renewable energy procurement.
Facility managers	Monetary reward	Other: Performance bonus tied to meeting targets for improving the sustainability/ energy efficiency of our operations.	Through quarterly individual- and team-level target-setting, regular performance reviews, and bonus programs, performance for many employees is tied to meeting targets related to energy efficiency, reduced energy use, and increased renewable energy procurement.
Environment/Sustainability managers	Monetary reward	Emissions reduction project Energy reduction project Efficiency project Behaviour change related indicator Environmental criteria included in purchases Other: Performance bonus tied to meeting targets for improving the sustainability/ energy efficiency of our operations.	Through quarterly individual- and team-level target-setting, regular performance reviews, and bonus programs, performance for many employees is tied to meeting targets related to energy efficiency, reduced energy use, and increased renewable energy procurement.
Public affairs managers	Monetary reward	Other: Performance bonus tied to meeting targets for communicating our sustainability/ energy efficiency initiatives externally.	This encompasses communications/ marketing/ public affairs managers. Through quarterly individual- and team-level target-setting, regular performance reviews, and bonus programs, performance for many employees is tied to meeting targets related to energy efficiency, reduced energy use, and increased renewable energy procurement.
Corporate executive team	Monetary reward	Emissions reduction target Energy reduction target	For Google's Senior VP of Technical Infrastructure, a member of the Corporate Executive Team, performance bonuses are tied to meeting quarterly targets for improving the sustainability / energy efficiency of our operations.

Further Information

Page: CC2. Strategy

CC2.1
Please select the option that best describes your risk management procedures with regard to climate change risks and opportunities

A specific climate change risk management process

CC2.1a
Please provide further details on your risk management procedures with regard to climate change risks and opportunities

Frequency of monitoring	To whom are results reported?	Geographical areas considered	How far into the future are risks considered?	Comment
Six-monthly or more frequently	Board or individual/sub-set of the Board or committee appointed by the Board	All of Alphabet's operations globally.	> 6 years	The scope of the process considers regulatory risks due to climate change that could increase energy costs.

CC2.1b
Please describe how your risk and opportunity identification processes are applied at both company and asset level

The Senior VP of Technical Infrastructure collaborates with risk management and operations teams to ensure risks and opportunities are evaluated across the company for mitigation of and adaptation for climate change. These risks and opportunities are 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. To mitigate these risks, we look for opportunities to procure wholesale renewable energy via long-term contracts with stable prices, such as the power purchase agreements (PPA) we work hard to procure.

In 2015, we entered into 7 more long-term renewable energy agreements which, together with our existing long-term contracts, provide over 2 GW of clean, renewable energy.

Risks are also assessed at an asset level by using the same models. For example, the risk assessment at individual data centers also includes using a shadow price for carbon to estimate expected future energy costs.

Beyond this, sustainability teams across the company work to integrate sustainability values and culture into day-to-day operations. Our data center teams aggressively pursue energy efficiency and sustainability improvements across their operations. Our offices mitigate climate change via our Sustainable Operations Program, which requires each participating office to comply with a set of annual and ongoing sustainability best practices, in addition to completing at least one data driven project each year to improve resource efficiency or reduce impact on the environment. In our supply chain, we employ a Supplier Code of Conduct and evaluate the risk of doing business with individual suppliers, which includes considerations of climate risk and conducting sustainable supply chain audits.

CC2.1c
How do you prioritize the risks and opportunities identified?

As part of the risk assessment and mitigation process, there are many factors we consider in deciding whether to pursue long-term renewable energy through contracts such as PPAs. We prioritize these factors by looking at the emissions reduction potential of sourcing renewable energy by avoiding electricity with a high carbon intensity and whether renewable energy can be

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

CC2.2
Is climate change integrated into your business strategy?

Yes

CC2.2a
Please describe the process of how climate change is integrated into your business strategy and any outcomes of this process

Since our founding, we have focused on providing the best user experience possible and we take great care to ensure that the products and services we provide serve our customers. We value efficiency in everything we do, from creating great 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, by choosing our products and services.

i. Because we believe climate change and environmental regulation may result in higher energy prices, our strategy has been influenced in two ways: (1) we seek to purchase renewable electricity for our operations, while (2) we launch new energy efficiency projects and design towards the highest energy efficiency possible.
Specifically, to mitigate future price rises in electricity costs (including those due to environmental regulation), we seek long-term contracts for renewable electricity and are relentlessly focused on improving energy efficiency in all our facilities, including data centers and office spaces.
Our internal collection and reporting process enables us to track progress toward our goals and influence future strategies. Both the Technical Infrastructure and Real Estate teams develop strategies to reach our goals. They are then translated into programs and projects whose results are then reported to the SVP of Technical Infrastructure and the VP of Real Estate quarterly. This process is embedded across the company and the feedback mechanism of quarterly reporting helps to further influence future strategies.
For example, our Real Estate team runs an internal Sustainable Operations Program that aligns health and sustainability strategy across Google's global facility portfolio. The Sustainable Operations Program requires each participating office to comply with a set of annual and ongoing sustainability best practices, in addition to completing at least one data driven project every year to improve environmental performance.
As we become more efficient, customers using our products and services inevitably do too, which also decreases their carbon footprint. For example, by moving its 17,000 employees to Google Apps and Gmail, the US General Services Administration reduced server energy consumption by nearly 90%.

ii. Physical and regulatory risks have influenced our strategy. Specifically, the potential increase in electricity prices due to the physical impacts of climate change and any resulting regulations have increased our push to source long-term contracts for renewable electricity to avoid exposure to electricity price volatility and/or increases. Additionally, regulatory opportunity also influenced this strategy; by adopting long-term contracts for renewable electricity now, we stay ahead of potential future regulations.
As we've noticed new opportunities resulting from climate change, we also have adopted several new product lines. For example, in 2015 we launched Project Sunroof, a new online tool that helps users estimate potential solar energy production and cost savings if they were to install a rooftop solar system.

iii. Energy risk management remains the most important component of our short-term strategy that has been 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 to 2010, our data centers now get 3.5 times the computing power from every watt of electricity we consume. 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 efficiency projects in our operations.

iv. In 2007, we announced our goal to become carbon neutral within the year, which we achieved, and we have maintained carbon neutrality for the last nine years in a row. In 2012, we set a long-term goal to power our operations with 100% renewable energy and we've made great strides towards achieving this—in 2015, we procured enough renewable energy to cover 44% of our operations and we joined the RE100 initiative and the We Mean Business coalition. As an interim step towards achieving our long-term goal and as part of the White House American Businesses Act on Climate Pledge, we committed to triple our purchase of renewable energy by 2025.
Our long-term goals to build a cleaner energy future will result in our products and services, and therefore ultimately our users, having a smaller environmental footprint. The most important component of this long-term strategy is our commitment to seek out long-term contracts for the purchase of renewable electricity. To meet that goal, we continue to pursue contracts of up to 20 years for the purchase of renewable electricity, which, over the long term, will reduce our carbon footprint and help protect us from the risks mentioned above. Another part of our long-term strategy is to encourage the development and deployment of more renewable energy through policy advocacy.

v. Our data centers use 50% less energy than the typical data center and are among the most efficient in the world, and we're currently the largest non-utility purchaser of renewable energy in the world. This helps us achieve strategic advantage over our competitors by ensuring stable electricity prices over the long term, lowering our operational costs, and helping protect us from the sourcing and potential regulatory risks mentioned above. Companies and users that choose our products and services can be confident that we are helping them minimize their environmental impact—even as their needs and services scale.

vi. In 2015, the most substantial business decisions we made that were influenced by climate change include signing new renewable energy contracts, regulatory work, and ongoing efficiency efforts in our data centers, as follows:
- We entered into 7 more long-term renewable energy agreements which, together with our existing long-term contracts, provide over 2 GW of clean, renewable energy. We were especially proud to announce our first-ever data center to be located on the site of a coal plant being scheduled for shutdown: the Widows Creek site in Alabama. We worked out an arrangement with the Tennessee Valley Authority to power this facility with 100% renewable energy from day 1.
- We engaged directly with policymakers to call for policies that promote renewable energy and/or reduce carbon emissions. For example, we engaged in a number of activities to advocate for a strong agreement at the UNFCCC COP21 in Paris
- We maintained a comprehensive energy management system (EnMS) for our data centers and corporate, multi-site ISO 50001 certification via an external audit

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

CC2.2c
Does your company use an internal price of carbon?

Yes

CC2.2d
Please provide details and examples of how your company uses an internal price of carbon

We use carbon prices as part of our risk assessment model. For example, the risk assessment at individual data centers also includes using a shadow price for carbon to estimate expected future energy costs.

CC2.3
Do you engage in activities that could either directly or indirectly influence public policy on climate change through any of the following? (tick all that apply)

Direct engagement with policy makers
Trade associations
Other

CC2.3a
On what issues have you been engaging directly with policy makers?

Focus of legislation	Corporate Position	Details of engagement	Proposed legislative solution

Clean energy generation	Support	OVERVIEW Google has served as a catalyst for policy change through targeted advocacy at the international, national and state levels. Members of Google's energy and public policy teams have engaged directly with policymakers from the US (including the White House, the Obama Administration, the U.S. Congress and Governors) and other countries to call for policies that promote renewable energy and/or reduce carbon emissions. This has included engagement on the following:	More local, regional, national and international policies to reduce dependence on carbon intensive power and support clean energy deployment.
Clean energy generation	Support	International climate policy: 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. - At COP21, Google hosted a major event on clean energy purchasing; we announced the largest, most diversified renewable energy purchase ever made by a non-utility; and we hosted portal space and participated in numerous panels and speeches on the need for urgent action in Paris - On July 27, 2015, Eric Schmidt, Executive Chairman of Alphabet Inc., published a post on the Google Green blog titled 'Rising to the climate challenge', which called for the “absolute and urgent necessity” of nations to reach a strong agreement (see: https://googleblog.blogspot.be/2015/07/rising-to-climate-challenge.html) - Google is a founding member of the White House's American Business Act on Climate Pledge, which voiced support for a strong Paris outcome. We were a founding member of this initiative, making a commitment to triple our renewable energy purchases (then 1.1GW) by 2025 (see: https://www.whitehouse.gov/the-press-office/2015/07/27/fact-sheet-white-house-launches-american-business-act-climate-pledge)	More international policies to reduce dependence on carbon intensive power and support clean energy deployment.
Clean energy generation	Support	European Union renewables policy: - We have engaged with the European Commission (EC) on their review of renewables legislation, seeking to improve access to renewables in the European Union (EU), such as easier access across national borders. By the end of 2016, the European Commission will issue two legislative proposals of key importance to the European renewable energy sector: (1) a directive defining the post-2020 legislative framework for the European renewable energy sector and (2) a legislative initiative to improve the electricity market design. Both will have significant impacts on the growth of renewables in the EU. Google filed written comments on both directives, met with key members of the European Commission and participated and spoke at key stakeholder meetings in Brussels and the U.S. - EU Energy Market Design comments: For our October 8, 2015, position paper 'Google Inc. Reply to the European Commission’s Public Consultation on a new Energy Market Design', see: https://ec.europa.eu/energy/en/consultations/public-consultation-new-energy-market-design. This document is also attached in the communications section. - EU Renewable Energy Directive comments: For our February 10, 2016, submission 'Preparation of a new Renewable Energy Directive for the period after 2020' (see: https://ec.europa.eu/energy/en/consultations/preparation-new-renewable-energy-directive-period-after-2020	More international policies to reduce dependence on carbon intensive power and support clean energy deployment.
Clean energy generation	Support	Taiwan energy policy: - In October 2015, we met with Taiwanese stakeholders in the government, academia, and non-profit sectors to discuss opportunities for Taiwan to establish programs that would allow companies to power their operations from renewable energy. This included meetings with the Bureau of Energy, NGOs like the Taiwan Renewable Energy Alliance and the Business Council for Sustainable Development Taiwan, and the Chung-hua Institute for Economic Research, amongst others.	More international policies to reduce dependence on carbon intensive power and support clean energy deployment.
Clean energy generation	Support	U.S. federal climate policy: U.S. Environmental Protection Agency (EPA)'s Clean Power Plan (CPP) We have been vocal proponents of the EPA Clean Power Plan, which included the following engagement in 2015: - CPP Declaration in Opposing Stay: On December 7, 2015, we filed a declaration in support of a brief filed by AEE, AWEA, and SEIA in opposition to the motion to stay the CPP (see: https://www.edf.org/sites/default/files/content/ngo-resp-opp-addendum-jk.pdf, Google’s declaration is on pg.951-956)	More national policies to reduce dependence on carbon intensive power and support clean energy deployment.
Clean energy generation	Support	U.S. state climate and energy policy: We have engaged on U.S. state renewable energy portfolio standards, state utility renewable energy programs, etc. For example: - Georgia Value of Solar Proceeding: In September, 2015, as a member of the Commercial Group, a corporate coalition that includes Walmart and other corporate renewable energy purchasers, Google submitted comments on the Georgia Value of Solar Proceeding (part of the Georgia Public Service Commission's Notice of Inquiry and Workshop to examine issues related to the value of renewable and distributed energy resources in preparation for Georgia Power's 2016 IRP proceeding) (see: Georgia PSC Docket #39732, which can be found at http://www.psc.state.ga.us/factsv2/Document.aspx?documentNumber=160332) - North Carolina halt to green energy freeze: In May, 2015, together with Apple and Facebook, we wrote jointly to the North Carolina legislature, urging them to preserve a key renewable energy state law that faced attack (see: http://www.charlotteobserver.com/news/local/article22504350.html) - North Carolina Green Source Rider (GSR): In November, 2015, we announced the first public GSR deal (61MW of solar) under a program we created with Duke Energy (see: http://googlegreenblog.blogspot.com/2015/11/buying-renewable-energy.html)	More state policies to reduce dependence on carbon intensive power and support clean energy deployment.

CC2.3b
Are you on the Board of any trade associations or provide funding beyond membership?

Yes

CC2.3c
Please enter the details of those trade associations that are likely to take a position on climate change legislation

Trade association	Is your position on climate change consistent with theirs?	Please explain the trade association's position	How have you, or are you attempting to, influence the position?
U.S. Partnership for Renewable Energy Finance (Founding Member) (US PREF)	Consistent	US PREF is a coalition of senior level financiers who invest in all sectors of the energy industry, including renewable energy. PREF members meet with policymakers to provide their perspectives on how renewable energy finance policies affect the market, and how proposed policies could affect the market. US PREF is not a lobbying organization or an advisory committee to government, rather it is an educational program that provides expert input on how the renewable energy finance market works. For more information about US PREF, see http://www.uspref.org/	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. Google is a founding member of US PREF.

Trade association	Is your position on climate change consistent with theirs?	Please explain the trade association's position	How have you, or are you attempting to, influence the position?
American Council on Renewable Energy (ACORE)	Consistent	ACORE, a 501(c)(3) non-profit membership organization, is dedicated to building a more secure and prosperous America with clean, renewable energy. ACORE provides a common educational platform for a wide range of interests in the renewable energy community, focusing on technology, finance and policy. It convenes thought leadership forums and creates energy industry partnerships to communicate the economic, security and environmental benefits of renewable energy. For more information about ACORE, see http://www.acore.org/	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.
WRI/WWF Corporate Renewable Energy Buyer's Principles	Consistent	The Buyers' Principles represent large customers' renewable energy needs and help them streamline solutions for buying cost-effective renewable energy. With facilitation by WWF and WRI, a group of large energy buyers developed the Buyers' Principles to spur progress on renewable energy and to add their perspective to the future of the U.S. energy and electricity system. For more information about the Buyer's Principles, see http://buyersprinciples.org/	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.
RE100	Consistent	Convened by The Climate Group in partnership with CDP, RE100 is a collaborative, global initiative of influential businesses committed to 100% renewable electricity, working to massively increase demand for—and delivery of—renewable energy. For more information about RE100, see http://there100.org/	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. In December, 2015, Google joined RE100 with an interim target to triple our purchase of renewable energy by 2025 and a long term goal to power all of our operations with renewables (See: http://www.theclimategroup.org/what-we-do/news-and-blogs/google-joins-re100-with-target-to-triple-renewable-energy-by-2025/).
North Carolina Sustainable Energy Association (NCSEA)	Consistent	NCSEA drives public policy & market development to create clean energy jobs, business opportunities, and affordable energy to benefit North Carolina. For more information about NCSEA, see http://www.energync.org/	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.
South Carolina Clean Energy Business Alliance (SCCEBA)	Consistent	SCCEBA promotes the success of the clean energy industry in South Carolina, representing the needs and interests of this growing industry through policy development, educational outreach to decision makers and strategic economic development. SCEEBA was instrumental in getting enactment of S.1189 in 2014 (a third party solar bill). For more information about SCCEBA, see http://www.scceba.org/	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.
The Wind Coalition	Consistent	The Wind Coalition is the industry trade association created to promote the development of wind energy as a clean, reliable, affordable, and infinite source of power. The Wind Coalition is the wind energy industry's voice within the Electric Reliability Council of Texas (ERCOT) and Southwest Power Pool (SPP) systems, which include Texas, Kansas, Oklahoma, Nebraska, Arkansas, Missouri, New Mexico, and Louisiana. For more information about the Wind Coalition, see http://windcoalition.org/	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.

CC2.3e
Please provide details of the other engagement activities that you undertake

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

The Google Earth Outreach and Earth Engine teams have helped organizations accelerate climate research. Google created the Earth Outreach program, which works directly with nonprofits to help them get the mapping resources needed to create knowledge about the environment and communicate it effectively to decision makers. For example, the Environmental Defense Fund (EDF) is working with Google to deploy methane sensors on Street View cars to detect methane leaks under city streets. This will enable EDF to create very high detail maps of fugitive emissions of methane, a powerful greenhouse gas, for use by utilities companies and regulators. For example, based on this data, New Jersey PSE&G approved a plan to replace up to 510 miles of old pipe. For more details, see:
- https://www.edf.org/climate/methanemaps
- http://blogs.edf.org/energyexchange/2015/11/16/jersey-utility-to-use-methane-data-mapped-by-google-street-view-cars-to-target-gas-line-repairs/
- http://googleforwork.blogspot.com/2016/04/Environmental-Defense-Fund-finds-methane-leaks-and-helps-slow-climate-change-using-Google-Maps-APIs.html
The World Resources Institute is also working with Google to develop better information and tools related to energy systems and decarbonization planning (see: http://www.wri.org/our-work/topics/climate)

Google Earth Engine Research Awards, structured as unrestricted gifts to universities to support the work of world-class full-time faculty members at top universities around the world, support cutting-edge geospatial data analysis and, in some cases also produce and disseminate public work on climate change. For example, in 2015, one of the awards was to the University of Hawaii at Manoa to evaluate and support zero deforestation supply chain commitments by mapping high carbon stock (HCS) forests in Sumatra and Borneo. For more information and the complete list of award recipients, see: http://research.google.com/university/relations/ee_awards.html.

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. Through the Climate Data Initiative, we provided one petabyte of cloud storage for data and climate/weather models, plus 50 million hours of high-performance cloud computing. We commit to continuing to develop products and platforms that can help reduce emissions and bring the power of cloud computing to climate science.

In 2015, Google funded several other research studies related to energy and/or climate change that were led by academic institutions, NGOs, and other partners. These studies focused on topics such as the energy impacts of internet services and data flows as well as tools for measuring climate and energy data.

Google employees were also co-authors on a number of public research papers, including one that quantifies global forest change and recognizes the importance of forest ecosystem services using Google Earth Engine. As of May 2016, this paper has received over 1000 citations. (see: http://www.sciencemag.org/content/342/6160/850)

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 Gmail, Google Calendar, Google Drive, Google Ad Grants, YouTube for Nonprofits and more -- all at no charge. This effort aims to support the social impact of nonprofits through easy access to Google's highly efficient products and services. Nonprofits can use Google's free tools to find new donors and volunteers, work efficiently and get supporters to take action on topics like climate change.

These efforts align with our climate change strategy because many of the nonprofits, such as the Natural Resources Defense Council (NRDC), engage in research and disseminate public work related to climate change. For example, NRDC uses Google Apps to communicate effectively and Ad Grants to drive more traffic to their website. They also use Google Maps and Google Earth to make vivid their environmental concerns and to share the data they've collected publicly in a visual, understandable way. For more information, see: https://www.google.com/nonprofits and https://www.google.com/nonprofits/casestudies/defense-council.html.

Lastly, Google is an active member of a number of coalitions working to address climate change and provide greater access to renewables. This includes the organizations listed in our response to question 2.3c above as well as many others.

CC2.3f
What processes do you have in place to ensure that all of your direct and indirect activities that influence policy are consistent with your overall climate change strategy?

All activities related to engagement on climate policy are coordinated and managed by designated members of our operations team who handle policy, our public policy team, and members of our communications team. These employees coordinate the drafting and review of all public-facing content related to our overall energy, sustainability and climate change strategy. Material is tracked centrally for reference and use by other employees and to further ensure consistency. These employees ultimately report to our Chief Legal Officer, who oversees our policy and

communications organizations. Sustainability teams throughout the organization use this team for review to ensure consistency with our overall climate change strategy. An opt-in organization-wide sustainability e-mail list also exists to update those interested on happenings with our overall climate change strategy and actions taken to support it.

Further Information

For more information on how climate change is integrated into our business strategy, see the resources below, as well as the attachments in section 4 'Communication': In 2015, we entered into 7 more long-term renewable energy agreements which, together with our existing long-term contracts, provide over 2 GW of clean, renewable energy. The complete list of new projects are: 1. A PPA for 43 MW of wind power in California 2. A PPA for 198 MW of wind power in Oklahoma 3. A PPA for 225 MW of wind power in Texas 4. A PPA for 225 MW of wind power in Oklahoma 5. An agreement with our North Carolina utility provider for 61 MW of solar power in the state 6. A PPA for 80 MW of solar power in Chile 7. A PPA for 76 MW of wind power in Sweden RENEWABLE ENERGY PROCUREMENT Our renewable energy website: https://www.google.com/green/energy/#power Our white paper 'Google's Green PPAs: What, How, and Why', published September 17, 2013: http://static.googleusercontent.com/external_content/untrusted_dlcp/cfz.cc/en/us/green/pdfs/renewable-energy.pdf HOW WE HELP USERS BECOME MORE EFFICIENT White Paper on Google Green Computing: http://static.googleusercontent.com/external_content/untrusted_dlcp/www.google.com/en/us/green/pdfs/google-green-computing.pdf White Paper on Google Apps Efficiency in the Cloud: http://static.googleusercontent.com/external_content/untrusted_dlcp/www.google.com/en/us/green/pdf/google-apps.pdf Google Maps Transit Information: http://googleblog.blogspot.com/2014/05/hop-on-boardand-go-almost-anywherewith.html OTHER Sustainable Efforts at our Offices: http://www.google.com/green/efficiency/oncampus/#building Google's Supplier Code of Conduct: http://www.google.com/about/company/responsible-manufacturing.html

Page: CC3. Targets and Initiatives

CC3.1
Did you have an emissions reduction or renewable energy consumption or production target that was active (ongoing or reached completion) in the reporting year?

Absolute target
Intensity target
Renewable energy consumption and/or production target

CC3.1a
Please provide details of your absolute target

ID	Scope	% of emissions in scope	% reduction from base year	Base year	Base year emissions covered by target (metric tonnes CO2e)	Target year	Is this a science-based target?	Comment
Abs1	Other: Scope 1 + 2 (market-based) + Scope 3 (upstream and downstream)	100%	100%	2015	2996834	2015	No, and we do not anticipate setting one in the next 2 years	We committed to being carbon neutral in 2007 and we have achieved this goal each year since then. We maintain our commitment to carbon neutrality first through energy efficiency, second, by signing long-term contracts for renewable energy directly from our utility providers and from green energy facilities in the same grid regions as our data centers, and lastly, by investing in high-quality carbon offset projects. We understand that CDP does not acknowledge carbon offsets as a way to reduce emissions, however, we do recognize offsets as a viable and important approach for mitigating our carbon emission impact, as well as a critical component of our carbon neutrality strategy.
Abs2	Scope 1+2 (market-based)	100%	100%	2015	1762152	2025	No, and we do not anticipate setting one in the next 2 years	Abs2 is the same as RE2 and is our interim target for Abs3. On July 27, 2015, as part of the White House American Business Act on Climate Pledge, Google committed to tripling our purchases of renewables (then 1.1GW) by 2025 (see: https://www.whitehouse.gov/the-press-office/2015/07/27/fact-sheet-white-house-launches-american-business-act-climate-pledge). This is expected to result in installed production capacity of 3.4GW of renewable power by 2025, and equates to a greenhouse gas emissions reduction of approximately 7 million metric tonnes of CO2 per year by 2025, 4.7 million of which will be achieved in the target period. Our calculations assume that the grid emissions factors in the target year remain the same. Our overall energy usage from base year to target year is expected to increase, so this target is expected to result in a reduction of emissions from base year to target year of 267%—more than 100%. Our % reduction from base year represents total emissions reductions in our target year due to purchases of renewables (4.7 million tCO2), as compared to our base year emissions covered by this target (1.8 million tCO2). [(4.7 million tCO2/1.8 million tCO2)*100 = 267%]. Our market-based Scope 2 emissions represented 96% of our combined Scope 1 and market-based Scope 2 emissions in 2015.
Abs3	Scope 1+2 (market-based)	100%	100%	2015	1762152	2040	No, and we do not anticipate setting one in the next 2 years	Abs3 is the same as RE1. Google's long-term goal is to power our operations with 100% renewable energy. For us, being '100% powered by renewables' means that Google purchases, on an annual basis, the same volume (in MWh) of renewable energy as the volume (in MWh) of energy that we consume for our operations, thus fully covering our Scope 2 emissions. 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 2015, Google joined the RE100 initiative—an initiative led by the Climate Group and CDP—as well as the We Mean Business coalition, committing to procure 100% of our electricity from renewable sources (see https://www.whitehouse.gov/the-press-office/2015/07/27/fact-sheet-white-house-launches-american-business-act-climate-pledge). As an interim target towards our 100% renewable goal, we committed to tripling our purchases of renewables by 2025 (see Abs2 and https://www.theclimategroup.org/news/google-joins-re100-target-triple-renewable-energy-purchases-2025). Our overall energy usage from base year to target year is expected to increase, so this target is expected to result in a reduction of emissions from base year to target year of at least 267%—more than 100%. Our % reduction from base year represents total emissions reductions in our target year due to purchases of renewables (4.7 million tCO2), as compared to our base year emissions covered by this target (1.8 million tCO2). [(4.7 million tCO2/1.8 million tCO2)*100 = 267%] Since we're using Abs2 as our interim target for Abs3 and it would be difficult to predict our emissions in 2040 (the target year for Abs3), we're using most of the same data here for Abs3 as we did for Abs2. As we pursue our 2040 target (Abs3), we know we will reduce at least 4.7 million tCO2 of emissions (our Abs2 target) sometime before 2040. The actual reduction in tCO2 will likely be greater as we believe our Scope 2 emissions will grow between our base year and 2040, and/or the year we hit 100% renewable energy. Our market-based Scope 2 emissions represented 96% of our combined Scope 1 and market-based Scope 2 emissions in 2015. We continue to look for ways to increase our use of clean energy, including trying new, innovative technologies at our offices.
Abs4	Scope 1+2 (market-based)	100%	0.01%	2014	1460762	2015	No, and we do not anticipate setting one in the next 2 years	This goal applies to reducing our Scope 2 emissions 0.005% as compared to 2014 via energy efficiency projects focused on lighting retrofits. The figure for %ge of emissions in scope represents our total Scope 2 emissions, including lighting and other energy uses. Our overall energy usage from our base year to our target year is expected to increase.

CC3.1b
Please provide details of your intensity target

ID	Scope	% of emissions in scope	% reduction from base year	Metric	Base year	Normalized base year emissions covered by target	Target year	Is this a science-based target?	Comment
Int1	Scope 1+2 (market-based)	0.47%	50%	Metric tonnes CO2e per unit FTE employee	2011	0.14	2025	No, and we do not anticipate setting one in the next 2 years	We have many emission reduction activities, and this is one we chose to highlight here. Google's NYC office has chosen to participate in the NYC Carbon Challenge. We have volunteered to go beyond the 30% greenhouse gas reduction per FTE employee by 2030 and instead work to a 50% reduction in metric tonnes CO2e per FTE employee by 2025 from 2011 baselines for Scope 1 and 2 emissions.

CC3.1c
Please also indicate what change in absolute emissions this intensity target reflects

ID	Direction of change anticipated in absolute Scope 1+2 emissions at target completion?	% change anticipated in absolute Scope 1+2 emissions	Direction of change anticipated in absolute Scope 3 emissions at target completion?	% change anticipated in absolute Scope 3 emissions	Comment
Int1	Decrease	0.48	No change	0	This target is related to Scope 1 and 2 emissions, therefore, we don't expect any change in Scope 3 emissions from this target specifically.

CC3.1d
Please provide details of your renewable energy consumption and/or production target

ID	Energy types covered by target	Base year	Base year energy for energy type covered (MWh)	% renewable energy in base year	Target year	% renewable energy in target year	Comment
RE1	Electricity consumption	2015	5743793	44%	2040	100%	RE1 is the same as Abs3. Google's long-term goal is to power our operations with 100% renewable energy. For us, being '100% powered by renewables' means that Google purchases, on an annual basis, the same volume (in MWh) of renewable energy as the volume (in MWh) of energy that we consume for our operations, thus fully covering our Scope 2 emissions. 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. (See: http://www.google.com/green/energy/use/#purchasing) By signing long-term contracts for renewable power, Google provides financial security to renewable generation projects and brings more green electricity on to the grid. Additionally, we hold ourselves to the highest standards when purchasing renewables, and our contracts meet strict criteria to ensure that our purchases are of the highest quality. Whenever we purchase renewable energy, we strive to meet three criteria. First, they create new sources of green power on the grid, to ensure "additionality". Second, the renewable attributes from the agreements are applied to our power consumption in the same year the energy is generated. And third, we purchase an equal quantity of "bundled" energy and green attributes in the same purchase. (See: http://googlegreenblog.blogspot.be/2016/02/google-green-blog-what-it-means-to-be_8.html) In 2015, Google joined the RE100 initiative—an initiative led by the Climate Group and CDP—as well as the We Mean Business coalition, committing to procure 100% of our electricity from renewable sources (see https://www.whitehouse.gov/the-press-office/2015/07/27/fact-sheet-white-house-launches-american-business-act-climate-pledge). As an interim target towards our 100% renewable goal, we committed to tripling our purchases of renewables by 2025 (see Abs2 and https://www.theclimategroup.org/news/google-joins-re100-target-triple-renewable-energy-purchases-2025). We've made great strides towards our 100% renewables goal. Google is currently the largest non-utility purchaser of renewable energy in the world. In 2015, we procured enough renewable energy to cover 44% of our operations, which equates to a 42% reduction of our market-based Scope 2 emissions. We continue to work on increasing this percentage going forward.
RE2	Electricity consumption	2015	5743793	44%	2025		RE2 is the same as Abs2 and is our interim target for RE1. On July 27, 2015, as part of the White House American Business Act on Climate Pledge, Google committed to tripling our purchases of renewables (then 1.1GW) by 2025 (see: https://www.whitehouse.gov/the-press-office/2015/07/27/fact-sheet-white-house-launches-american-business-act-climate-pledge). This is expected to result in installed production capacity of 3.4GW of renewable power by 2025, and equates to a greenhouse gas emissions reduction of approximately 7 million metric tonnes of CO2 per year by 2025, 4.7 million of which will be achieved in the target period. Our calculations assume that the grid emissions factors in the target year remain the same.

CC3.1e
For all of your targets, please provide details on the progress made in the reporting year

ID	% complete (time)	% complete (emissions or renewable energy)	Comment
Abs1	100%	100%	Every year, we have a goal of being carbon neutral. As of December 31, 2015, we reached carbon neutrality for 100% of our Scope 1, 2, and 3 emissions through this approach.
Abs2	9%	42%	Abs2 is the same as RE2 and is our interim target for Abs3. On July 27, 2015, Google committed to tripling our purchases of renewables (then 1.1GW) by 2025, which equates to an installed production capacity of 3.4GW of renewable power and a greenhouse gas emissions reduction of approximately 7 million metric tonnes of CO2 per year by 2025, 4.7 million of which will be achieved in the target period. As of December 31, 2015, we had entered into 15 long-term renewable energy agreements which, together, are estimated to displace 4.4 million metric tonnes of CO2 per year, putting us 42% of the way towards this goal.
Abs3	4%	40%	Abs3 is the same as RE1. Google is committed to powering our operations with 100% renewable energy and we've made great strides towards this goal. In 2015, we procured enough renewable energy to cover 44% of our operations, which equates to a 42% reduction of our market-based Scope 2 emissions and a 40% reduction of our combined Scope 1 and market-based Scope 2 emissions. We continue to work on increasing this percentage going forward.
Abs4	100%	100%	This goal applies to reducing our Scope 2 emissions 0.005% as compared to 2014 via energy efficiency projects focused on lighting retrofits. We initiated this program in 2014 and completed all planned projects by December 31, 2015.
RE1	4%	44%	RE1 is the same as Abs3. Google is committed to powering our operations with 100% renewable energy and we've made great strides towards this goal. In 2015, we procured enough renewable energy to cover 44% of our operations, which equates to a 42% reduction of our market-based Scope 2 emissions. We continue to work on increasing this percentage going forward.
RE2	9%	38%	RE2 is the same as Abs2 and is our interim target for RE1. On July 27, 2015, Google committed to tripling our purchases of renewables (then 1.1GW) by 2025, which equates to an installed production capacity of 3.4GW of renewable power and a greenhouse gas emissions reduction of approximately 7 million metric tonnes of CO2 per year by 2025, 4.7 million of which will be achieved in the target period. As of December 31, 2015, we had entered into 15 long-term renewable energy agreements which, together, are estimated to represent 2GW of installed production capacity, putting us 38% of the way towards this goal.
Int1	33%	73%	Google is committed to reducing our Scope 1 and 2 emissions per FTE (full-time employee) by 50% in our New York City office by 2025. As of Dec.31, 2015, we have achieved a 37% reduction of Scope 1 and 2 emissions per FTE through various energy efficiency and emissions reductions projects, putting us 73% of the way towards this goal.

CC3.2
Do you classify any of your existing goods and/or services as low carbon products or do they enable a third party to avoid GHG emissions?

Yes

CC3.2a
Please provide details of your products and/or services that you classify as low carbon products or that enable a third party to avoid GHG emissions

Level of aggregation	Description of product/Group of products	Are you reporting low carbon product/s or avoided emissions?	Taxonomy, project or methodology used to classify product/s as low carbon or to calculate avoided emissions	% revenue from low carbon product/s in the reporting year	% R&D in low carbon product/s in the reporting year	Comment
Group of products	Google Apps: Including Google Apps, Google Apps for Work, and Google Apps for Education Google Consumer Apps include Gmail, Inbox, Drive, Docs (Docs, Sheets, and Slides), Forms, Keep, Calendar, and Sites. There are currently 240 million active Drive users. Google Apps for Work is a cloud-based productivity suite that helps your employees connect and get work done from anywhere on any device. It includes: Gmail, Drive, Docs (Docs, Sheets, and Slides), and Hangouts	Low carbon product	Other: Our own methodology			A number of Google's products and services directly help users avoid Scope 2 GHG emis avoided due to our data center energy efficiency efforts as well as our carbon neutrality. T businesses that use our cloud-based products are greener too. We studied the energy effi products by looking at the use of Google Apps at large. By switching to Google Apps (PDF reduced office computing costs, energy use, and carbon emissions by 65% to 90%. Since neutral, we help further mitigate the carbon impact for businesses that use Google Apps. one of our large Google Apps clients, the U.S. General Services Administration (GSA), su By switching to Google Apps for its approximately 17,000 users, the GSA reduced server by nearly 90% and carbon emissions by 85%. This represents an annual emissions reduc of CO2. For more information, see our white paper "Google Apps: Energy Efficiency in the http://static.googleusercontent.com/external_content/untrusted_dlcp/www.google.com/en/ apps.pdf
Product	Gmail: Gmail is advanced email with a huge inbox, lightning-fast search, built-in instant messaging, voice calling and video chat. There are currently 1 billion Gmail users.	Low carbon product	Other: Our own methodology			A number of Google's products and services directly help users avoid Scope 2 GHG emis Gmail, Google's cloud-based email service, is more energy efficient than email hosted loc supports many products at a time, so it can more efficiently distribute resources among m means we can do more with less energy—and businesses can too. In addition, we've eng based services to run on efficient custom-designed servers that live in data centers that w efficient as possible. Lawrence Berkeley National Laboratory recently published research all office workers in the United States to the cloud could reduce the energy used by inform up to 87%. To learn more about the energy efficiency potential of cloud-based software, se http://crd.lbl.gov/assets/pubs_presos/ACS/cloud_efficiency_study.pdf Businesses that use decreased the environmental impact of their email service by up to 98% compared to thos local servers. Google can provide Gmail service to 80 companies for the same amount of company would typically use to run email services locally. Small businesses with fewer tha save up to 172.8 kWh of energy and 101.6 kg of carbon per user per year by using Gmail, 1,490,925 tonnes of CO2 net savings over one year. Further details and methodology can published white paper "Google's Green Computing: Efficiency at Scale". (See: http://static.googleusercontent.com/external_content/untrusted_dlcp/www.google.com/en/ green-computing.pdf)
Group of products	Google Cloud Platform: Google Cloud Platform enables developers to build, test, and deploy applications on Google's highly-scalable and reliable infrastructure. Key products include: Compute Engine, App Engine, Container Engine, BigQuery, Cloud Storage, Cloud Bigtable, Cloud Networking, and Cloud Machine Learning For more information on Google Cloud Platform, see: https://cloud.google.com/products/	Low carbon product	Other: Our own methodology			A number of Google's products and services directly help users avoid scope 2 GHG emiss developers and businesses work in the cloud with Google Cloud Platform, they're using ar uses 50% less energy than the average data center, is carbon neutral, and adheres to the environmental, health and safety standards. In fact, compared to 5 years ago, Google Infr deliver over 3.5 times as much compute power for the same amount of energy. Businesse using Google Cloud Platform gain the scale and performance of working on the same gre powers Google services, while also reaping the benefits of our commitment to renewable going work to increase efficiency. For more information on Google Cloud Products & Servi https://cloud.google.com/products/ See also our response above specific to Gmail, which based services.
Product	Google Maps helps assist people as they navigate and explore the world, wherever they are. With Google Maps you get all the information you need in one place including business information, ratings and reviews, and more for 100+ million places around the world.	Avoided emissions	Other: Avoided emissions represent the third party's Scope 1 emissions.			Several features in Google Maps help people reduce their personal carbon footprint by fac alternate forms of transportation. With Google Maps you can pinpoint the places and infor quickly, whether it's how many minutes until the next bus arrives, or how long it will take to work to home. Google Maps has transit information for 6,000+ agencies, 3 million transit s cities and towns in 64 countries. We provide over 1 billion km worth of transit results every trams and subways included in Google Maps travel 200 million kilometers daily, the equiva road in the world three times. For more information, see our blog post on Google Maps an http://googleblog.blogspot.com/2014/05/hop-on-boardand-go-almost-anywherewith.html
Product	Project Sunroof	Avoided emissions	Other: Avoided emissions represent the third party's Scope 1 and/or Scope 2 emissions.			Project Sunroof is a new Google product that helps its users decide whether or not to go s their address on the Project Sunroof site, Google will use 3D mapping of rooftops and nea estimate potential solar energy production if they were to install a rooftop solar system. Pr combines this production estimate with detailed, localized information about weather, utilit and incentives to generate an accurate estimate of the financial benefits of going solar. Th it easy for users to connect with solar installers and take the next step towards going solar in August 2015 and the end of 2015, Project Sunroof expanded from 2 U.S. states to the t including 14M rooftops mapped--and served over 600K users. For more information, see: https://www.google.com/get/sunroof
Product	Nest Learning Thermostat	Avoided emissions	Other: Avoided emissions represent the third party's Scope 1 and/or Scope 2 emissions.			The Nest Learning Thermostat uses learning algorithms and smart control of the heating a to reduce home energy consumption and the associated Scope 1 and Scope 2 emissions. the thermostat at one temperature and forget to change it, while the Nest Thermostat lear programs itself and can be controlled from your phone. Energy savings studies conducted independent parties show that, on average, the Nest Thermostat saves US customers abo heating bills and about 15% on their cooling bills. For more information on how Nest helps see: - Impact: https://nest.com/downloads/press/documents/nest-corporate-fact-sheet.pdf Rewards (helps reduce the load on the electrical grid during times when demand for energ https://nest.com/support/article/What-is-Rush-Hour-Rewards - Seasonal Savings: https://nest.com/support/article/What-is-Seasonal-Savings
Product	Makani	Avoided emissions	Other: Avoided emissions represent the third party's Scope 1 and/or Scope 2 emissions.			Makani, a project in X, is working to make clean energy accessible for everyone by develo new type of wind turbine that can access stronger and steadier winds at higher altitudes to energy with less materials. These high-performance aerodynamic energy kites can elimina materials of conventional wind turbines, generate 50% more energy and be sited in more requiring less ground space, thus bringing electricity to locations where access to energy i information, see: http://www.google.com/makani/

Level of aggregation	Description of product/Group of products	Are you reporting low carbon product/s or avoided emissions?	Taxonomy, project or methodology used to classify product/s as low carbon or to calculate avoided emissions	% revenue from low carbon product/s in the reporting year	% R&D in low carbon product/s in the reporting year	Comment
Company-wide	Other: Alphabet and Google offer many products and services in addition to those mentioned above, including Search, Chrome, Android, Play, Travel, Translate, Payments, Fiber, Photos, and YouTube. There are currently over 1.4 billion 30-day active Android users around the world. YouTube has over a billion users - almost one-third of all people on the Internet - and everyday people watch hundreds of millions of hours on YouTube and generate billions of views.	Low carbon product	Other: Our own methodology			Many of Alphabet's and Google's products and services directly help users avoid Scope 2 since our infrastructure uses 50% less energy than average data centers, we are carbon r adhere to the highest certified environmental, health and safety standards. Compared to 5 infrastructure can now deliver over 3.5 times as much compute power for the same amour

CC3.3
Did you have emissions reduction initiatives that were active within the reporting year (this can include those in the planning and/or implementation phases)

Yes

CC3.3a
Please identify the total number of projects at each stage of development, and for those in the implementation stages, the estimated CO2e savings

Stage of development	Number of projects	Total estimated annual CO2e savings in metric tonnes CO2e (only for rows marked *)
Under investigation	8	
To be implemented*	9	4464
Implementation commenced*	5	50
Implemented*	70	5356
Not to be implemented	9	

CC3.3b
For those initiatives implemented in the reporting year, please provide details in the table below

Activity type	Description of activity	Estimated annual CO2e savings (metric tonnes CO2e)	Scope	Voluntary/ Mandatory	Annual monetary savings (unit currency - as specified in CC0.4)	Investment required (unit currency - as specified in CC0.4)	Payback period	Estimated lifetime of the initiative	Comment
Energy efficiency: Building services	LEED EB:O&M Gold certification for our Dublin office obtained in 2015, as a result of 4 individual energy efficiency projects implemented in 2015.	77	Scope 2 (market-based)	Voluntary	17241	2173	<1 year	Ongoing	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. Amounts for investment required are pre-incentive (they do not incorporate any potential rebates earned). Payback periods are post-incentive (they do incorporate any potential rebates earned).
Energy efficiency: Building services	LEED EB:O&M Gold certification for our Zurich office obtained in 2015, as a result of 9 individual energy efficiency projects implemented in 2014.	8	Scope 2 (market-based)	Voluntary	24485	3500	<1 year	Ongoing	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. Amounts for investment required are pre-incentive (they do not incorporate any potential rebates earned). Payback periods are post-incentive (they do incorporate any potential rebates earned).
Energy efficiency: Building services	Energy efficiency projects in our San Francisco Bay area offices. In 2015, 35 individual projects were implemented.	147	Scope 2 (market-based)	Voluntary					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. Amounts for investment required are pre-incentive (they do not incorporate any potential rebates earned). Payback periods are post-incentive (they do incorporate any potential rebates earned).
Energy efficiency: Building services	Ongoing implementation of 8 multi-year energy efficiency projects in our New York office as part of the NYC Carbon Challenge. In 2015, significant progress was made on 6 individual projects.	527	Scope 1 Scope 2 (market-based)	Voluntary	1188300	11016744	4-10 years	21-30 years	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. Amounts for investment required are pre-incentive (they do not incorporate any potential rebates earned). Payback periods are post-incentive (they do incorporate any potential rebates earned).
Energy efficiency: Building services	Lighting retrofits at our data centers. In 2015, 4 individual projects were implemented at sites in the US, Europe, and Asia.	173	Scope 2 (market-based)	Voluntary	47653	325492	4-10 years	16-20 years	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. Amounts for investment required are pre-incentive (they do not incorporate any potential rebates earned). Payback periods are post-incentive (they do incorporate any potential rebates earned).

Activity type	Description of activity	Estimated annual CO2e savings (metric tonnes CO2e)	Scope	Voluntary/ Mandatory	Annual monetary savings (unit currency - as specified in CC0.4)	Investment required (unit currency - as specified in CC0.4)	Payback period	Estimated lifetime of the initiative	Comment
Energy efficiency: Building services	Energy efficiency projects implemented at our Taiwan data center. In 2015, 5 individual projects were implemented.	432	Scope 2 (market-based)	Voluntary	55784	0	<1 year	>30 years	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. Amounts for investment required are pre-incentive (they do not incorporate any potential rebates earned). Payback periods are post-incentive (they do incorporate any potential rebates earned).
Energy efficiency: Building services	Reduce run time for air handling units at our data centers during cooler months.	789	Scope 2 (market-based)	Voluntary	285398	41080	<1 year	>30 years	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. Amounts for investment required are pre-incentive (they do not incorporate any potential rebates earned). Payback periods are post-incentive (they do incorporate any potential rebates earned).

CC3.3c
What methods do you use to drive investment in emissions reduction activities?

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

Further Information

For more information on our renewable energy procurement, see our renewable energy website (https://www.google.com/green/energy/#power) or our white paper 'Google's Green PPAs: What, How, and Why', published September 17, 2013. (http://static.googleusercontent.com/external_content/untrusted_dlcp/cfz.cc/en/us/green/pdfs/renewable-energy.pdf)

Page: CC4. Communication

CC4.1
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	Status	Page/Section reference	Attach the document	Comment
In mainstream reports (including an integrated report) but have not used the CDSB Framework	Complete	Page 13	https://www.cdp.net/sites/2016/16/7616/Climate Change 2016/Shared Documents/Attachments/CC4.1/Alphabet - 2015 10-K.pdf	In our 10-K for the fiscal year ended December 31, 2015, “the effects of climate change” was added in ITEM 1A. RISK FACTORS, in the section ‘Risks Related to Our Businesses and Industries’, subsection 'Interruption or failure of our information technology and communications systems could hurt our ability to effectively provide our products and services, which could damage our reputation and harm our operating results.'
In voluntary communications	Complete	Page 1	https://www.cdp.net/sites/2016/16/7616/Climate Change 2016/Shared Documents/Attachments/CC4.1/Google Green screenshot - Homepage.png	The overview page of our Google Green website (google.com/green), as of June 30, 2016. Our Google Green website provides many resources to learn more about our sustainability commitments and initiatives. For videos about our green initiatives, see: https://www.youtube.com/user/googlegreen/videos
In voluntary communications	Complete	Page 1	https://www.cdp.net/sites/2016/16/7616/Climate Change 2016/Shared Documents/Attachments/CC4.1/Research at Google - Earth Engine Research Awards.pdf	Google Earth Engine Research Awards; 2015 Award Recipients
In voluntary communications	Complete	Pages 1-3	https://www.cdp.net/sites/2016/16/7616/Climate Change 2016/Shared Documents/Attachments/CC4.1/2015_01_08 - Google Research Blog_Map of Life.pdf	Google Research Blog from Jan.8, 2015 'Map of Life: A preview of how to evaluate species conservation with Google Earth Engine'
In voluntary communications	Complete	Pages 1-2	https://www.cdp.net/sites/2016/16/7616/Climate Change 2016/Shared Documents/Attachments/CC4.1/2015_02_11 - Google Green Blog_From Altamont Pass to Mountain View_ Getting more renewable energy on the grid.pdf	Google Green Blog from Feb.11, 2015 'From Altamont Pass to Mountain View: Getting more renewable energy on the grid
In voluntary communications	Complete	Pages 1-2	https://www.cdp.net/sites/2016/16/7616/Climate Change 2016/Shared Documents/Attachments/CC4.1/2015_05_28 - Tech giants urge halt to green-energy freeze _ The Charlotte Observer.pdf	In May, 2015, together with Apple and Facebook, we wrote jointly to the North Carolina legislature, urging them to preserve a key renewable energy state law that faced attack. This is a copy of the May 28, 2015 article in the Charlotte Observer.
In voluntary communications	Complete	Pages 1-3	https://www.cdp.net/sites/2016/16/7616/Climate Change 2016/Shared Documents/Attachments/CC4.1/2015_06_24 - Official Google Blog_ A power plant for the Internet_ our newest data center in Alabama.pdf	Official Google Blog from June 24, 2015 'A power plant for the Internet: our newest data center in Alabama'
In voluntary communications	Complete	Pages 1-4, 8-9	https://www.cdp.net/sites/2016/16/7616/Climate Change 2016/Shared Documents/Attachments/CC4.1/2015_07_27 - FACT SHEET_ White House Launches American Business Act on Climate Pledge _ whitehouse.pdf	White House Fact Sheet from July 27, 2015 'FACT SHEET: White House Launches American Business Act on Climate Pledge'
In voluntary communications	Complete	Pages 1-2	https://www.cdp.net/sites/2016/16/7616/Climate Change 2016/Shared Documents/Attachments/CC4.1/2015_07_27 - Official Google Blog_ Rising to the climate challenge.pdf	Official Google Blog from July 27, 2015 'Rising to the climate challenge', by Eric Schmidt, Executive Chairman of Alphabet Inc., calling on nations to reach a strong agreement in Paris as an “absolute and urgent necessity”.

Publication	Status	Page/Section reference	Attach the document	Comment
In voluntary communications	Complete	Pages 1-3	https://www.cdp.net/sites/2016/16/7616/Climate Change 2016/Shared Documents/Attachments/CC4.1/2015_08_17 - Google Green Blog_ Project Sunroof_ mapping the planet's solar energy potential, one rooftop at a time.pdf	Google Green Blog from August 17, 2015 'Project Sunroof: mapping the planet's solar energy potential, one rooftop at a time'
In other regulatory filings	Complete	Pages 1-14	https://www.cdp.net/sites/2016/16/7616/Climate Change 2016/Shared Documents/Attachments/CC4.1/2015_09_24 - Georgia Value of Solar - Reply Comments of the Commercial Group.pdf	September 24, 2015: As a member of the Commercial Group, a corporate coalition that includes Walmart and other corporate renewable energy purchasers, Google submitted comments on the Georgia Value of Solar Proceeding (part of the Georgia Public Service Commission's Notice of Inquiry and Workshop to examine issues related to the value of renewable and distributed energy resources in preparation for Georgia Power's 2016 IRP proceeding).
In voluntary communications	Complete	Pages 1-2	https://www.cdp.net/sites/2016/16/7616/Climate Change 2016/Shared Documents/Attachments/CC4.1/2015_09_28 - Google Green Blog_ Making the invisible visible by mapping air quality.pdf	Google Green Blog from September 28, 2015 'Making the invisible visible by mapping air quality'
In voluntary communications	Complete	Pages 1-3	https://www.cdp.net/sites/2016/16/7616/Climate Change 2016/Shared Documents/Attachments/CC4.1/2015_09_29 - Google Green Blog_ Cutting the crap_ 8 things you may not know that Google is doing to reduce waste.pdf	Google Green Blog from September 29, 2015 'Cutting the crap: 8 things you may not know that Google is doing to reduce waste"
In voluntary communications	Complete	Pages 1-2	https://www.cdp.net/sites/2016/16/7616/Climate Change 2016/Shared Documents/Attachments/CC4.1/2015_10_01 - Google Green Blog_ Finalists Announced for the Little Box Challenge.pdf	Google Green Blog from October 1, 2015 'Finalists Announced for the Little Box Challenge'
In other regulatory filings	Complete	Pages 1-6	https://www.cdp.net/sites/2016/16/7616/Climate Change 2016/Shared Documents/Attachments/CC4.1/2015_10_08 - 263. Google Position paper - EC Public Consultation on New Energy Market Design.pdf	Our position paper submitted on October 8, 2015 'Google Inc. Reply to the European Commission's Public Consultation on a new Energy Market Design'. For more information, see https://ec.europa.eu/energy/en/consultations/public-consultation-new-energy-market-design
In other regulatory filings	Complete	Pages 1-18	https://www.cdp.net/sites/2016/16/7616/Climate Change 2016/Shared Documents/Attachments/CC4.1/2015_10_08 - 263. Google Questionnaire.pdf	Our questionnaire submitted on October 8, 2015 for the European Commission's Public Consultation on a new Energy Market Design'. For more information, see https://ec.europa.eu/energy/en/consultations/public-consultation-new-energy-market-design
In voluntary communications	Complete	Pages 1-3	https://www.cdp.net/sites/2016/16/7616/Climate Change 2016/Shared Documents/Attachments/CC4.1/2015_10_20 - Google Green Blog_ Investing in Africa's largest wind project.pdf	Google Green Blog from October 20, 2015 'Investing in Africa's largest wind project'
In voluntary communications	Complete	Pages 1-2	https://www.cdp.net/sites/2016/16/7616/Climate Change 2016/Shared Documents/Attachments/CC4.1/2015_10_29 - Google Green Blog_ Tracking our annual carbon footprint.pdf	Google Green Blog from October 29, 2015 'Tracking our annual carbon footprint'
In voluntary communications	Complete	Pages 1-2	https://www.cdp.net/sites/2016/16/7616/Climate Change 2016/Shared Documents/Attachments/CC4.1/2015_11_24 - Google Green Blog_ Creating new pathways for buying renewable energy.pdf	Google Green Blog from November 24, 2015 'Creating new pathways for buying renewable energy'
In voluntary communications	Complete	Pages 1-3	https://www.cdp.net/sites/2016/16/7616/Climate Change 2016/Shared Documents/Attachments/CC4.1/2015_12_03 - Official Google Blog_ Powering the Internet with renewable energy.pdf	Official Google Blog from December 3, 2015 'Powering the Internet with renewable energy'
In voluntary communications	Complete	Pages 1-2	https://www.cdp.net/sites/2016/16/7616/Climate Change 2016/Shared Documents/Attachments/CC4.1/2015_12_03 - Google joins RE100 with target to triple renewable energy purchases by 2025 _ The Climate Group.pdf	The Climate Group press release from December 3, 2015 'Google joins RE100 with target to triple renewable energy purchases by 2025'
In other regulatory filings	Complete	Pages 1-6	https://www.cdp.net/sites/2016/16/7616/Climate Change 2016/Shared Documents/Attachments/CC4.1/2015_12_07 - Google Stay Opposition Declaration - FINAL EXECUTED.pdf	Google filed a declaration opposing stay of the EPA's CPP on December 7, 2015.
In voluntary communications	Complete	Pages 1-7	https://www.cdp.net/sites/2016/16/7616/Climate Change 2016/Shared Documents/Attachments/CC4.1/2015_12_07 - Fastcoexist - How Google And Other Giant Corporations Are Going 100 Percent Renewable.pdf	Media article from December 7, 2015 by Fastcoexist.com 'How Google and Other Giant Corporations are Going 100% Renewable'
In voluntary communications	Complete	Pages 1-2	https://www.cdp.net/sites/2016/16/7616/Climate Change 2016/Shared Documents/Attachments/CC4.1/2015_12_10 - Google Green Blog_ Should you go solar_ Just ask Project Sunroof_.pdf	Google Green blog from December 10, 2015 'Should you go solar? Just ask Project Sunroof.'
In voluntary communications	Complete	Pages 1-3	https://www.cdp.net/sites/2016/16/7616/Climate Change 2016/Shared Documents/Attachments/CC4.1/2015_12_16 - Google Green Blog_ Notes from COP21.pdf	Google Green blog from December 16, 2015 'Notes from COP21'
In voluntary communications	Complete	Pages 1-3	https://www.cdp.net/sites/2016/16/7616/Climate Change 2016/Shared Documents/Attachments/CC4.1/2015_12_22 - Google Green Blog_ Welcoming Internet Engine No.pdf	Google Green blog from December 22, 2015 'Welcoming Internet Engine No.15'
In voluntary communications	Complete	Page 1	https://www.cdp.net/sites/2016/16/7616/Climate Change 2016/Shared Documents/Attachments/CC4.1/2015_09_29 - EMF - Announcement of Google as Global Partner.png	Media article from September 29, 2015 by the Ellen MacArthur Foundation: 'The Ellen MacArthur Foundation announces Google as a Global Partner'

Publication	Status	Page/Section reference	Attach the document	Comment
In voluntary communications	Complete	Pages 1-4	https://www.cdp.net/sites/2016/16/7616/Climate Change 2016/Shared Documents/Attachments/CC4.1/2015_06_02 - Google Maps Blog -Google Lat Long_ Mind the (g)app for real-time transit information.pdf	Google Maps Blog from June 2, 2015 'Mind the (g)app for real-time transit information'
In voluntary communications	Complete	Pages 1-3	https://www.cdp.net/sites/2016/16/7616/Climate Change 2016/Shared Documents/Attachments/CC4.1/2015_07_17 - Google Green Blog_ A solar-powered round-the-world tour to promote clean technologies.pdf	Official Google Blog from July 17, 2015 'A solar-powered round-the-world tour to promote clean technologies'

Further Information

Module: Risks and Opportunities

Page: CC5. Climate Change Risks

CC5.1
Have you identified any inherent climate change risks that have the potential to generate a substantive change in your business operations, revenue or expenditure? Tick all that apply

Risks driven by changes in regulation
Risks driven by changes in physical climate parameters
Risks driven by changes in other climate-related developments

CC5.1a
Please describe your inherent risks that are driven by changes in regulation

Risk driver	Description	Potential impact	Timeframe	Direct/ Indirect	Likelihood	Magnitude of impact	Estimated financial implications	Management method	Cost of management

Carbon taxes	We have very few direct emissions of greenhouse gases, therefore we do not expect our operations to be directly impacted by climate policy in the US, nor do we expect to participate in any current or future compliance markets for carbon trading in the US. Google does, however, face the risk of increased costs of energy if a price on carbon is applied through legislation such as cap and trade (or other mechanisms such as taxation). To the extent that this price is passed on to us from a regulated entity, the cost of running our operations will increase. However, we already operate some of the most efficient data centers in the world, procure renewable power for our data centers, and generate onsite renewable energy at several of our offices, all of which reduce our exposure to this risk. In addition, we already include a shadow price for carbon in our data center siting analysis so we take this risk into account even before we build a data center. Finally, we are carbon-neutral through the purchase of high-quality carbon offsets, so in effect, we already include a carbon price in our operations. For example, in June 2015, we announced our first-ever data center to be located on the site of a coal plant being scheduled for shutdown: the Widows Creek site in Alabama (see: https://googleblog.blogspot.com/2015/06/a-power-plant-for-internet-our-newest.html). In addition, we worked out an arrangement with the Tennessee Valley Authority to power the facility with 100% renewable energy from day 1.	Increased operational cost	1 to 3 years	Indirect (Client)	Unlikely	Medium	If a carbon price of e.g. $14/metric tonne were established through regulation (price of carbon/tonne at AB32 Auction in May 2014), this could increase our costs by ~$24M [= (Scope 1 + market-based Scope 2) * $14], assuming these costs were passed through to electricity consumers and we were not further able to reduce our carbon footprint. The financial impact would likely be less as we already voluntarily purchase carbon offsets.	While the regulatory risk to our business is small, we are minimizing our exposure to this risk by working to run the most efficient computer infrastructure in the world. Through efficiency innovations, we have managed to cut energy usage in our data centers so that we're using significantly less energy than the industry average. For example, in 2015, we achieved PUEs (power usage effectiveness ratios) as low as 1.08, whereas industry standard is in the 1.5-2.0 range. We achieved this through the use of increasingly efficient power supplies, evaporative cooling technology, machine learning and other innovations. An additional risk mitigation activity is our work to procure wholesale renewable energy via long-term contracts with stable prices. In 2015, we announced 7 more renewable energy commitments to procure 908 additional MW of wind and solar power to power our data centers and offices in California, Oklahoma, North Carolina, Finland, and Chile.	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. So from a net point of view, these improvements come at zero net cost.

Lack of regulation	We are closely monitoring state renewable portfolio 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. Recently, there have been efforts to weaken or roll back these standards in some states. If they are weakened, it will make it more difficult for Google to meet its renewable energy goals. We are also monitoring the implementation of the EPA Clean Power Plan, which is another driver for increasing renewable energy in the states where we operate.	Increased operational cost	1 to 3 years	Direct	More likely than not	Medium	A rollback in state renewable portfolio standards or the EPA Clean Power Plan would make it more difficult for Google to meet its renewable energy goals by decreasing access to renewable energy in states where we operate. This would mean we would have to find other alternatives to procurement of renewable power which are likely to be more expensive than taking it directly from the grid.	We have been working directly with federal and state policymakers, NGOs, and others in industry to provide support for these policies	The costs of this engagement are headcount on our public policy team, travel costs for trips to states where renewable portfolio standards are under attack, and dues paid to national trade organizations.

CC5.1b
Please describe your inherent risks that are driven by changes in physical climate parameters

Risk driver	Description	Potential impact	Timeframe	Direct/ Indirect	Likelihood	Magnitude of impact	Estimated financial implications	
Change in mean (average) temperature	Nature of the physical effect concerned: we must cool our data centers to keep them in operation, and the amount of energy needed for the cooling 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. Location of this physical effect concerned: 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. As of Dec.31, 2015, Google owned and operated 15 large data centers across North America, South America, Europe, and Asia. To learn more about our data centers and their locations, see: https://www.google.com/about/datacenters/inside/locations/index.html	Increased operational cost	>6 years	Direct	Very likely	Low-medium	In general, we expect that our cooling costs will go up proportionately to the increase in cooling-degree-days due to increasing average temperatures. We are not able to predict the exact temperature increase, but if, for example, the number of cooling-degree-days increased by 10%, we would expect a 10% rise in our cooling costs, assuming we were not further able to improve our energy efficiency. This would have a low-medium negative financial impact.	While the risk to our business working to run the most efficie to cut energy usage in our da example, in 2015, we achieve in the 1.5-2.0 range. We achi technology, machine learning world, we minimize the risk th increase energy use and emi to the average global temper http://www.google.com/about http://googlegreenblog.blogsp http://static.googleusercontent learning-applicationsfor-datac

CC5.1c
Please describe your inherent risks that are driven by changes in other climate-related developments

Risk driver	Description	Potential impact	Timeframe	Direct/ Indirect	Likelihood	Magnitude of impact	Estimated financial implications	Management method

Reputation	Disclosure of and properly addressing climate change risks and impacts associated with the IT industry and proliferation of the cloud is becoming more and more important. Not only does a company need to speak to the efforts they're making, they also need to show through their actions that they are making improvements or taking mitigation measures. Not addressing climate change risks and impacts head on could result in a reduced demand for our goods and services because of negative reputation impact. The 2015 Best Global Brands report, produced independently by Interbrand, ranks Google as the second most valuable global brand. Negative reputation could result in a decrease in brand value and in a loss of future brand equity.	Reduced demand for goods/services	>6 years	Direct	About as likely as not	Low	This risk driver could have a negative impact on our brands. For example, the 2015 Best Global Brands report, produced independently by Interbrand, estimates Google's brand value at approximately $120 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 $120 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.	We continually strive to make our processes more efficient and reduce our impac our customers reduce their footprint as well, by choosing our products and servic are saving time and money with Google Maps - and getting where they need to b the environment. Google also works to accelerate the development of renewable renewable energy agreements to power our company, but also through renewabl side, for over 10 years, we've been building and running some of the most efficie white papers and posts on our green blog we work to establish transparency to h in 2014, we published a white paper on machine learning and data center optimiz http://static.googleusercontent.com/media/www.google.com/en/us/about/datacent learning-applicationsfor-datacenter-optimization-finalv2.pdf In 2015, we entered ir energy agreements which, together with our existing long-term contracts, provide energy.

Fluctuating socio-economic conditions	Nature of the effect concerned: At Google, our innovations in search and advertising have made our website widely used and our brand one of the most recognized in the world. Google's revenue is largely based on search advertising. Advertisers advertise to users because they believe the users are in a position to become customers via an economic transaction as a result of the advertisement. Advertisers pay Google for the ability to advertise via our online properties. Fluctuating socio-economic conditions due to climate change could have a negative impact on Google's revenue if it causes users to reduce the rate of economic transactions and thus causes advertisers to demand less online advertising.	Reduced demand for goods/services	>6 years	Direct	Unlikely	Medium	Fluctuating socio-economic conditions could have a negative impact on Google's revenue if they cause users to reduce the rate of economic transactions and thus cause advertisers to demand less online advertising. It is difficult to predict the magnitude of this risk, given the indirect nature of the relationship between climate change and online consumer economic activity. That said, we generated 90% of total Google segment revenues from advertising in 2015. If, for example, all online economic activity decreased by 1%, we could experience a commensurate reduction in our share of this activity.	Since avoiding or minimizing climate change would reduce this risk, activities to p help to minimize this risk. We actively engage with policy makers to support local, policies to reduce dependence on carbon intensive power and support clean ene engaged in a number of activities to advocate for a strong agreement at the Unite Climate Change (UNFCCC) twenty-first annual Conference of the Parties (COP2 30th to December 11th, 2015 in Paris. For more information on our clean energy to question CC2.3a.

Further Information

Page: CC6. Climate Change Opportunities

CC6.1
Have you identified any inherent climate change opportunities that have the potential to generate a substantive change in your business operations, revenue or expenditure? Tick all that apply

Opportunities driven by changes in regulation
Opportunities driven by changes in physical climate parameters
Opportunities driven by changes in other climate-related developments

CC6.1a
Please describe your inherent opportunities that are driven by changes in regulation

Opportunity driver	Description	Potential impact	Timeframe	Direct/Indirect	Likelihood	Magnitude of impact	Estimated financial implications	Management method	Cost of management

Fuel/energy taxes and regulations	Carbon regulation as an efficiency driver: Any regulation that imposes a price on carbon or regulates carbon emissions may incentivize customers to switch their technology infrastructure to Google For Work enterprise solutions and take advantage of Google's cloud, which is highly efficient and operates under a 100% renewable energy goal. This could create additional demand for Google's existing products and/or services.	Increased demand for existing products/services	1 to 3 years	Direct	About as likely as not	Medium	If new carbon regulations are implemented, Google is in a position to grow its products and services as its data centers use 50% less energy than a typical data center. For illustrative purposes, if a new energy efficiency regulation resulted in a hypothetical regulatory advantage for Google and yielded an unpredictable 0.1% increase in revenue, Google's annual revenue could increase by approximately $75 million (based on FY 2015 revenue of $75 billion).	We've worked hard to minimize the environmental impact of our product and services and we continue to find new ways to reduce our impact even further. Our data centers are some of the most efficient in the world--they use only 50% of the energy of most other data centers. This means that when we provide an active user one month of Google services, we use less energy than driving a car one mile. Additionally, we're the first major Internet services company to gain external certification of our high environmental and energy management standards throughout our data centers. Currently, very little of the world's power is from renewables like wind and solar. We're working on changing that by buying electricity directly from wind farms near our data centers. In 2015, we entered into 7 more long-term renewable energy agreements which, together with our existing long-term contracts, provide over 2 GW of clean, renewable energy. We're also working with our utility partners to find solutions that will make more renewable energy available for us and for others. By making our products and services more efficient and running on renewable energy, Google is creating an alternative solution for business that will be beneficial should regulation come forth, allowing our customers to hedge against future energy costs.	The main costs associated with our sustainability efforts are the headcount of engineers, program managers, and partner managers working on these initiatives, as well as software development costs.

Cap and trade schemes	Carbon regulation as a renewables driver: Future regulatory systems that put a price on carbon could increase the amount of renewable power that states are incentivized or required to procure, or restrict the buildout of more carbon intense power. 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. By the end of 2015, Google had committed nearly $2.5 billion in the financing of large-scale renewable energy projects across the globe (separate from the PPAs we use to purchase renewable energy for our own operations). We view this as an opportunity to help deploy renewable energy at larger scale while at the same time making investments that have an attractive return given the risks in those projects. We continue to look for opportunities for further investments around the globe.	Investment opportunities	1 to 3 years	Direct	About as likely as not	Medium-high	The International Energy Agency (IEA) estimates that the world will spend $26 trillion over the next two decades to build the energy infrastructure necessary to meet global demand. Bloomberg New Energy Finance (NEF) estimates that $7 trillion will be spent through 2020 for renewable energy. This presents a tremendous business opportunity for the private sector to help pave the path towards a clean energy future while making attractive risk adjusted returns. In pursuing this opportunity, Google has already committed nearly $2.5 billion of investments in large scale renewable energy projects and residential solar rooftop funds with a total capacity of over 3.7GW. In 2015 alone, Google made commitments to invest over $540m into renewable energy projects in both the US and overseas.	Google employs renewable energy investment professionals to source, review, and execute investments in utility-scale renewable energy projects. We also engage external consultants for financial and technical diligence. For each investment, we obtain approval from an internal investment committee as well as from senior executives. We also have an asset management team for ongoing management of these investments.	By the end of 2015, Google had committed nearly $2.5 billion to investments in renewable energy projects around the world. Other costs include the staff time to source, analyze, and execute the deals. We also have an internal asset management team for ongoing management of these investments.

CC6.1b
Please describe the inherent opportunities that are driven by changes in physical climate parameters

Opportunity driver	Description	Potential impact	Timeframe	Direct/ Indirect	Likelihood	Magnitude of impact	Estimated financial implications	Management method	Cost of management

Induced changes in natural resources	Our products help drive carbon mitigation efforts and inform climate science. We see an opportunity to help raise awareness about the physical changes to the Earth's natural resources and climate through Google Earth and other products. Google has developed Google Earth Engine (earthengine.google.org), a planetary scale platform for environmental data & analysis that brings together the world's satellite imagery and makes it available online. 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.	Wider social benefits	Up to 1 year	Direct	Virtually certain	Medium	To date, Google Earth Engine has primarily been a philanthropic project that has not made money, but this could change as the product evolves. If customers value Google Earth Engine as a tool to examine the physical changes to the Earth's natural resources and climate, this could result in increased customer loyalty or brand value. This opportunity driver could have a positive impact on our brands. For example, the 2015 Best Global Brands report, produced independently by Interbrand, estimates Google's brand value at approximately $120 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 $120 million via brand loyalty created by wider social benefits.	Earth Engine was developed to bring together the world's satellite imagery—trillions of scientific measures dating back more than 40 years—and make it available online with tools for scientists, independent researchers, and nations to mine this massive warehouse of data about Earth's natural resources to detect changes, map trends and quantify differences on the earth's surface. Using this new technology platform, we've already begun helping scientists develop applications for detecting deforestation—the destruction of one of the Earth's important natural resources—and mapping land use trends, and have started working with individual countries to develop their own applications. For example, Global Forest Watch—an online forest monitoring system created by the World Resources Institute (WRI)—was launched in 2014 with Google and a group of more than 40 partners. Global Forest Watch uses technologies including Google Earth Engine and Google Maps Engine to map the world's forests with satellite imagery, detect changes in forest cover in near-real-time, and make this information freely available to anyone with Internet access. By accessing the most current and reliable information, everyone can learn what's happening in forests around the world (see: http://googleresearch.blogspot.com/2014/02/monitoring-worlds-forests-with-global.html). For more information on other similar engagements, see our response to question 2.3e.	The main costs associated with our Earth Engine efforts are headcount, software development, petabytes of data storage and the processing of this data (i.e. running scientific algorithms) in our data centers.

CC6.1c
Please describe the inherent opportunities that are driven by changes in other climate-related developments

Opportunity driver	Description	Potential impact	Timeframe	Direct/ Indirect	Likelihood	Magnitude of impact	Estimated financial implications	
Reputation	Disclosure of and properly addressing climate change risks and impacts associated with the IT industry and proliferation of the cloud is becoming more and more important. Not only does a company need to speak to the efforts they're making, they also need to show through their actions that they are making improvements or taking mitigation measures. Addressing climate change opportunities head on could result in an increased demand for our goods and services because of positive reputation impact.	Increased demand for existing products/services	>6 years	Direct	About as likely as not	Medium	This opportunity driver could have a positive impact on our brands. For example, the 2015 Best Global Brands report, produced independently by Interbrand, estimates Google's brand value at approximately $120 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 $120 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.	We contin our custor are saving the enviro towns/citie renewable we've bee on our gre white pap http://stati learning-a and poten

Opportunity driver	Description	Potential impact	Timeframe	Direct/ Indirect	Likelihood	Magnitude of impact	Estimated financial implications	
Induced changes in human and cultural environments	Growing demand for energy: With the rising need for energy, we expect renewable energy to play an integral part in the world's energy infrastructure. By being an early investor and deploying smart capital to fund utility-scale projects, we believe we can accelerate the deployment of the latest clean energy technologies while providing attractive returns to Google as well as more capital for developers to build additional projects. This is a global opportunity as there are renewable energy opportunities worldwide, across different geographies and technology types. We're not only investing in large scale renewable energy projects, but also in funds that help to deploy solar PV panels on residential homes, where the falling costs of solar PV have made distributed generation much more economic and in some regions already competitive with retail rates. We see this growth in distributed generation, accelerated by the drop in PV prices, as another opportunity to accelerate the deployment of clean energy technologies while providing attractive returns to Google. In 2015, Google committed to invest in the largest wind farm in Africa, which, when complete, will have a capacity of ~15% of the current grid in Kenya. As solar costs continue to drop, there will also be greater opportunities to deploy more distributed solar, which is more economical.	Investment opportunities	Up to 1 year	Indirect (Client)	Very likely	Medium	IEA estimates that the world will spend $26 trillion over the next two decades to build the energy infrastructure necessary to meet global demand. BNEF states that 2015 was the first time that renewable energy (excluding large hydro) made up over half of all the energy capacity additions worldwide and estimates that $7 trillion will be spent through 2020 for renewable energy. This presents a tremendous business opportunity for the private sector to help build a clean energy future while making attractive risk adjusted returns. In pursuing this opportunity, Google has already committed nearly $2.5 billion of investments in large scale renewable energy projects and residential solar rooftop funds with a total capacity of over 3.7GW. In 2015 alone, Google made commitments to invest over $540 million into renewable energy projects in both the US and overseas. For more Information on Google's renewable energy project investments, see: http://www.google.com/green/energy/investments/	Google er renewable investmer an asset r put $300 r homeown their past
Changing consumer behaviour	As climate change occurs, we expect that energy prices will increase and hence, more consumers will use public and alternative transportation rather than private vehicles. We therefore see an opportunity for increased use of Google Transit, which provides public transit directions and walking and biking routes in Google Maps. As can be seen at www.google.com/transit, Google Transit provides maps & schedules for public transit systems in cities worldwide. Currently, Google Maps serves one billion active monthly users with mapping tools. Google Maps has transit information for more than 6,000 transportation agencies, 3 million transit stations, bus stops, and ferry terminals, and 20,000 cities and towns in 64 countries. We provide over 1 billion km worth of transit results every day. Buses, trains, trams and subways included in Google Maps travel 200 million kilometers every day - that's the equivalent of driving every single road in the world three times. For more information about how Google maps helps users minimize their impact on the environment, see: http://www.google.com/green/products/#maps or http://googleblog.blogspot.com/2014/05/hop-on-boardand-go-almost-anywherewith.html.	Increased demand for existing products/services	Up to 1 year	Direct	Very likely	Low-medium	Google Transit and biking/walking routes are a feature of Google Maps, a free online tool potentially monetizable through advertising. We expect that increased demand for transit directions/schedules would mean more users of Google Maps, which could potentially translate into greater potential ad revenue. For example, if due to climate change, transit use increased 10% among Google Maps users, we would expect a commensurate (though not necessarily proportional) increase in potential ad revenue.	Transit on Google M agencies alike. We visually in mobile de Earth. Go

Further Information

Module: GHG Emissions Accounting, Energy and Fuel Use, and Trading

Page: CC7. Emissions Methodology

CC7.1
Please provide your base year and base year emissions (Scopes 1 and 2)

Scope	Base year	Base year emissions (metric tonnes CO2e)
Scope 1	Thu 01 Jan 2009 - Thu 31 Dec 2009	10919
Scope 2 (location-based)	Thu 01 Jan 2009 - Thu 31 Dec 2009	1147991
Scope 2 (market-based)	Thu 01 Jan 2009 - Thu 31 Dec 2009	1147991

CC7.2
Please give the name of the standard, protocol or methodology you have used to collect activity data and calculate Scope 1 and Scope 2 emissions

Please select the published methodologies that you use
The Greenhouse Gas Protocol: A Corporate Accounting and Reporting Standard (Revised Edition)

CC7.2a
If you have selected "Other" in CC7.2 please provide details of the standard, protocol or methodology you have used to collect activity data and calculate Scope 1 and Scope 2 emissions

CC7.3
Please give the source for the global warming potentials you have used

Gas	Reference
CO2	Other: IPCC

CC7.4
Please give the emissions factors you have applied and their origin; alternatively, please attach an Excel spreadsheet with this data at the bottom of this page

Fuel/Material/Energy	Emission Factor	Unit	Reference
Other: Please see the attachments in the Further information section below.			Location-based Scope 2: Electricity: US regional emissions factors are from US EPA, Emissions & Generation Resource Integrated Database (eGRID) Tenth edition with year 2012 data (Version 1.0), released 10/08/2015; China and Taiwan emissions factors are from the Greenhouse Gas Protocol, GHG Protocol Calculation Tools, Emissions Factors Cross-Sector Tools (April 2014 Version); Rest of World emissions factors are from the International Energy Agency (IEA), CO2 Emissions from Fuel Combustion (2015 edition) (2013 data) CO2 per kWh of electricity purchased from IEA. Market-based Scope 2: Residual mix is only available for the EU countries: European Residual Mixes 2014, Reliable Disclosure Systems for Europe – Phase II (RE-DISS II); for the other geographies, we used the same emissions factors as for the location-based category. All other factors: All other emissions factors are pulled from the Greenhouse Gas Protocol, GHG Protocol Calculation Tools, Emissions Factors Cross-Sector Tools (April 2014 Version)

Further Information

EMISSIONS FACTORS Location-based Scope 2: Electricity: US regional emissions factors are from US EPA, Emissions & Generation Resource Integrated Database (eGRID) Tenth edition with year 2012 data (Version 1.0), released 10/08/2015; China and Taiwan emissions factors are from the Greenhouse Gas Protocol, GHG Protocol Calculation Tools, Emissions Factors Cross-Sector Tools (April 2014 Version); Rest of World emissions factors are from the International Energy Agency (IEA), CO2 Emissions from Fuel Combustion (2015 edition) (2013 data) CO2 per kWh of electricity purchased from IEA. Market-based Scope 2: Residual mix is only available for the EU countries: European Residual Mixes 2014, Reliable Disclosure Systems for Europe – Phase II (RE-DISS II); for the other geographies, we used the same emissions factors as for the location-based category. All other factors: All other emissions factors are pulled from the Greenhouse Gas Protocol, GHG Protocol Calculation Tools, Emissions Factors Cross-Sector Tools (April 2014 Version)

Attachments

https://www.cdp.net/sites/2016/16/7616/Climate Change 2016/Shared Documents/Attachments/ClimateChange2016/CC7.EmissionsMethodology/Q7.4_EU Residual Mix_161-RE-DISS_2014_Residual_Mix_Results_2015-05-15_corrected2.pdf
https://www.cdp.net/sites/2016/16/7616/Climate Change 2016/Shared Documents/Attachments/ClimateChange2016/CC7.EmissionsMethodology/Q7.4_IEA_World_CO2kWh.xlsx
https://www.cdp.net/sites/2016/16/7616/Climate Change 2016/Shared Documents/Attachments/ClimateChange2016/CC7.EmissionsMethodology/Q7.4_US EPA_eGRID2005_SummaryTables.pdf
https://www.cdp.net/sites/2016/16/7616/Climate Change 2016/Shared Documents/Attachments/ClimateChange2016/CC7.EmissionsMethodology/Q7.4_GHG Protocol_Emission-Factors-from-Cross-Sector-Tools-(April 2014)_0.xlsx

Page: CC8. Emissions Data - (1 Jan 2015 - 31 Dec 2015)

CC8.1
Please select the boundary you are using for your Scope 1 and 2 greenhouse gas inventory

Operational control

CC8.2
Please provide your gross global Scope 1 emissions figures in metric tonnes CO2e

66991

CC8.3
Does your company have any operations in markets providing product or supplier specific data in the form of contractual instruments?

Yes

CC8.3a
Please provide your gross global Scope 2 emissions figures in metric tonnes CO2e

Scope 2, location-based	Scope 2, market-based (if applicable)	Comment
2694531	1695161	

CC8.4
Are there are 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?

Yes

CC8.4a
Please provide details of the sources of Scope 1 and Scope 2 emissions that are within your selected reporting boundary which are not included in your disclosure

Source	Relevance of Scope 1 emissions from this source	Relevance of location-based Scope 2 emissions from this source	Relevance of market-based Scope 2 emissions from this source (if applicable)	Explain why the source is excluded
Non-CO2 sources of emissions are excluded from the chemical boundary	Emissions are not relevant	Emissions are not relevant	Emissions are not relevant	Other chemicals such as methane (CH4) and nitrous oxide (N2O) are considered negligible to our operations and were excluded from the chemical boundary.

CC8.5
Please estimate the level of uncertainty of the total gross global Scope 1 and 2 emissions figures that you have supplied and specify the sources of uncertainty in your data gathering, handling and calculations

Scope	Uncertainty range	Main sources of uncertainty	Please expand on the uncertainty in your data
Scope 1	More than 2% but less than or equal to 5%	Assumptions Metering/ Measurement Constraints	Alphabet's Scope 1 emissions come primarily from vehicles and equipment where direct metering is not feasible. Instead, we rely on a combination of fuel records and assumptions, which results in a small amount of uncertainty. Our quantitative assessment of the amount of uncertainty (less than or equal to 5%) is based on the materiality applied to our independent verification, not based on analysis of each source of uncertainty.
Scope 2 (location-based)	More than 2% but less than or equal to 5%	Assumptions Metering/ Measurement Constraints	A small amount of Alphabet's location-based Scope 2 emissions comes from sources where direct metering is not feasible. Instead, we rely on some assumptions, which results in a small amount of uncertainty overall. Our quantitative assessment of the amount of uncertainty (less than or equal to 5%) is based on the materiality applied to our independent verification, not based on analysis of each source of uncertainty.
Scope 2 (market-based)	More than 2% but less than or equal to 5%	Assumptions Metering/ Measurement Constraints	A small amount of Alphabets's market-based Scope 2 emissions comes from sources where direct metering is not feasible. Instead, we rely on some assumptions, which results in a small amount of uncertainty overall. Our quantitative assessment of the amount of uncertainty (less than or equal to 5%) is based on the materiality applied to our independent verification, not based on analysis of each source of uncertainty.

CC8.6
Please indicate the verification/assurance status that applies to your reported Scope 1 emissions

Third party verification or assurance process in place

CC8.6a
Please provide further details of the verification/assurance undertaken for your Scope 1 emissions, and attach the relevant statements

Verification or assurance cycle in place	Status in the current reporting year	Type of verification or assurance	Attach the statement	Page/section reference	Relevant standard	Proportion of reported Scope 1 emissions verified (%)
Annual process	Complete	Limited assurance	https://www.cdp.net/sites/2016/16/7616/Climate Change 2016/Shared Documents/Attachments/CC8.6a/CDP Verification Letter_Google CY2015_vFINAL.pdf	Pages 1 to 4	ISO14064-3	100

CC8.7
Please indicate the verification/assurance status that applies to at least one of your reported Scope 2 emissions figures

Third party verification or assurance process in place

CC8.7a
Please provide further details of the verification/assurance undertaken for your location-based and/or market-based Scope 2 emissions, and attach the relevant statements

Location-based or market-based figure?	Verification or assurance cycle in place	Status in the current reporting year	Type of verification or assurance	Attach the statement	Page/Section reference	Relevant standard	Proportion of reported Scope 2 emissions verified (%)
Location-based	Annual process	Complete	Limited assurance	https://www.cdp.net/sites/2016/16/7616/Climate Change 2016/Shared Documents/Attachments/CC8.7a/CDP Verification Letter_Google CY2015_vFINAL.pdf	Pages 1 to 4	ISO14064-3	100
Market-based	Annual process	Complete	Limited assurance	https://www.cdp.net/sites/2016/16/7616/Climate Change 2016/Shared Documents/Attachments/CC8.7a/CDP Verification Letter_Google CY2015_vFINAL.pdf	Pages 1 to 4	ISO14064-3	100

CC8.8
Please identify if any data points have been verified as part of the third party verification work undertaken, other than the verification of emissions figures reported in CC8.6, CC8.7 and CC14.2

Additional data points verified	Comment
Other: Carbon dioxide emissions from biologically sequestered carbon (CC8.9a)	Verification and assurance details are the same as those referenced in our response to question CC8.7a

CC8.9
Are carbon dioxide emissions from biologically sequestered carbon relevant to your organization?

Yes

CC8.9a
Please provide the emissions from biologically sequestered carbon relevant to your organization in metric tonnes CO2

14356

Further Information

Page: CC9. Scope 1 Emissions Breakdown - (1 Jan 2015 - 31 Dec 2015)

CC9.1
Do you have Scope 1 emissions sources in more than one country?

Yes

CC9.1a
Please break down your total gross global Scope 1 emissions by country/region

Country/Region	Scope 1 metric tonnes CO2e
United States of America	55431
Rest of world	11560

CC9.2
Please indicate which other Scope 1 emissions breakdowns you are able to provide (tick all that apply)

Further Information

Page: CC10. Scope 2 Emissions Breakdown - (1 Jan 2015 - 31 Dec 2015)

CC10.1
Do you have Scope 2 emissions sources in more than one country?

Yes

CC10.1a
Please break down your total gross global Scope 2 emissions and energy consumption by country/region

Country/Region	Scope 2, location-based (metric tonnes CO2e)	Scope 2, market-based (metric tonnes CO2e)	Purchased and consumed electricity, heat, steam or cooling (MWh)	Purchased and consumed low carbon electricity, heat, steam or cooling accounted in market-based approach (MWh)
United States of America	1964382	856275		
Rest of world	730150	838885		

CC10.2
Please indicate which other Scope 2 emissions breakdowns you are able to provide (tick all that apply)

Further Information

Page: CC11. Energy

CC11.1
What percentage of your total operational spend in the reporting year was on energy?

CC11.2
Please state how much heat, steam, and cooling in MWh your organization has purchased and consumed during the reporting year

Energy type	Energy purchased and consumed (MWh)
Heat	0
Steam	0
Cooling	0

CC11.3
Please state how much fuel in MWh your organization has consumed (for energy purposes) during the reporting year

311957

CC11.3a
Please complete the table by breaking down the total "Fuel" figure entered above by fuel type

Fuels	MWh
Biodiesels	72808
Diesel/Gas oil	35709
Jet kerosene	24277
Landfill gas	22563
Motor gasoline	41614
Natural gas	114987

CC11.4
Please provide details of the electricity, heat, steam or cooling amounts that were accounted at a low carbon emission factor in the market-based Scope 2 figure reported in CC8.3a

Basis for applying a low carbon emission factor	MWh consumed associated with low carbon electricity, heat, steam or cooling	Comment
Off-grid energy consumption from an onsite installation or through a direct line to an off-site generator	8335	We have various on-site renewable installations in place at our offices globally. These facilities include landfill gas and solar PV. All power is consumed on-site.
Other	2075139	This green power comes from 6 large, long-term power purchase agreements or contracts we've signed in the US (4) and in Sweden (2). We've categorized these as "Other" since we purchase power and RECs from the same supplier (so not "tracking instruments"), because we manage the RECs (so not "supplier specific"), and because they are backed by instruments (so not "PPAs not backed by instruments). For all the US projects, we receive the green-e eligible RECs and retire them. In Sweden, the guarantees of origin (GOs) are transferred to our account and left to expire, because the retirement cannot be completed as the power is not consumed in Sweden (it is consumed in Finland). For more information on these contracts, please see http://www.google.com/green/energy/use/#purchasing.

CC11.5
Please report how much electricity you produce in MWh, and how much electricity you consume in MWh

Total electricity consumed (MWh)	Consumed electricity that is purchased (MWh)	Total electricity produced (MWh)	Total renewable electricity produced (MWh)	Consumed renewable electricity that is produced by company (MWh)	Comment
5743793	5734314	9479	8335	8335	Out of the Consumed electricity that is purchased, 2,075,139 MWh is renewable power procured through PPAs and other contractual mechanisms (CC11.4)

Further Information

Page: CC12. Emissions Performance

CC12.1
How do your gross global emissions (Scope 1 and 2 combined) for the reporting year compare to the previous year?

Increased

CC12.1a
Please 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

Reason	Emissions value (percentage)	Direction of change	Please explain and include calculation

Emissions reduction activities	18	Decrease	The impact of emission reduction activities in 2015 is an 18% reduction compared to the emissions we reported last year. In 2015, emissions reduction activities accounted for a large share of our emission reductions, primarily from two activities -- (1) In 2015, our green power purchases (in excess of our 2014 green power purchases) resulted in significant emissions reductions in our total footprint (2) In addition to emission reductions from green power purchases, our emissions also declined due to emission reduction programs and activities at our data centers, such as machine learning, improved hardware utilization, improved optimization of data center operations, and more efficient data center designs. In addition to these two primary emissions reduction activities, 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. In 2015, our additional renewable power purchases (in excess of our 2014 renewable power purchases) (261,311 tCO2e) and our energy efficiency efforts (5,356 tCO2e) together resulted in an additional reduction of 266,667 tCO2e beyond our 2014 emissions reduction activities. In 2014, our total Scope 1 and market-based Scope 2 emissions were 1,512,564 tCO2e. Therefore we arrived at 18% as follows: [(261,311+5,356)/1,512,564]*100= 18%. We also continued to make improvements in our PUE, though our average PUE for 2015 was 1.12, which is unchanged from 2014. While the savings generated by our energy efficiency initiatives cannot be directly accounted for in this number, we believe that our emissions reductions activities are actually much larger than we are able to quantify. We have done our best to estimate the contribution from our emission 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			
Acquisitions			
Mergers			
Change in output	17	Increase	As a large and complex multi-national company, there are many factors impacting our emissions and it is impossible to isolate perfectly any one particular factor and quantify it exactly. Based upon the comparison of 2014 to 2015 reported data, growth of our business created a 17% increase in our emissions compared to the emissions we reported last year. This change in output was calculated by taking our 2015 Scope 1 and market-based Scope 2 emissions minus the 2014 Scope 1 and market-based Scope 2 emissions, divided by the 2014 Scope 1 and market-based Scope 2 emissions, then multiplied by 100. This percent change would be a 23% increase if this figure were calculated using our location-based Scope 2 emissions.
Change in methodology			
Change in boundary			
Change in physical operating conditions			
Unidentified			
Other			

CC12.1b
Is your emissions performance calculations in CC12.1 and CC12.1a based on a location-based Scope 2 emissions figure or a market-based Scope 2 emissions figure?

Market-based

CC12.2
Please describe your gross global combined Scope 1 and 2 emissions for the reporting year in metric tonnes CO2e per unit currency total revenue

Intensity figure =	Metric numerator (Gross global combined Scope 1 and 2 emissions)	Metric denominator: Unit total revenue	Scope 2 figure used	% change from previous year	Direction of change from previous year	Reason for change
0.0000235	metric tonnes CO2e	74989000000	Market-based	2.54	Increase	The primary reason for this increase is the modification in our market-based Scope 2 accounting methodology as per the new GHG Protocol Scope 2 Guidance. The new market-based Scope 2 methodology requires the use of residual grid mixes, after accounting for all contractual instruments (PPAs). This change in methodology resulted in a slight increase in our 2015 market-based Scope 2 emissions, as compared to our 2014 market-based Scope 2 emissions (which we calculated using our own methodology). If we used the same market-based accounting methodology for our Scope 2 emissions in 2015 as in 2014, then this intensity figure would have decreased by 7% (21.29 MTCO2e/$M in 2015 as compared to 22.92 MTCO2e/$M in 2014). In addition, while our combined Scope 1 and market-based Scope 2 emissions increased 16.5% from 2014 to 2015, our revenue increased by a smaller percentage (13.6%) over the same period, which contributed to the increase in our intensity figure. The primary reason for this decrease (when using the same Scope 2 accounting methodology as the one used last year) is emissions reduction activities associated with our aggressive procurement of renewables, which we significantly increased in 2015 as compared to 2014. As a large and complex multi-national company, it's impossible to determine the exact cause of emissions reductions, but we estimate that at least 50% of this decrease can be attributed to our additional procurement of renewables in 2015 (above that in 2014). In addition, we continue to deliver more and better services and products to more users using less energy and fewer emissions, as well as to operate our data centers and offices more efficiently (see: http://www.google.com/green/efficiency/).

CC12.3
Please provide any additional intensity (normalized) metrics that are appropriate to your business operations

Intensity figure =	Metric numerator (Gross global combined Scope 1 and 2 emissions)	Metric denominator	Metric denominator: Unit total	Scope 2 figure used	% change from previous year	Direction of change from previous year	Reason for change
30.31	metric tonnes CO2e	full time equivalent (FTE) employee		Market-based	2.35	Decrease	The primary reason for the decrease in our FTE employee intensity figure is emissions reduction activities associated with our aggressive procurement of renewables, which we significantly increased in 2015 as compared to 2014. As a large and complex multi-national company, it's impossible to determine the exact cause of emissions reductions, but we estimate that at least 50% of this decrease can be attributed to our additional procurement of renewables in 2015 (above that in 2014). In addition, we continue to deliver more and better services and products to more users using less energy and fewer emissions, as well as to operate our data centers and offices more efficiently (see: http://www.google.com/green/efficiency/). As mentioned in our response to CC12.2 above, the modification in our market-based Scope 2 accounting methodology as per the new GHG Protocol Scope 2 Guidance resulted in a slight increase in our combined Scope 1 and market-based Scope 2 emissions in 2015, which would not have occurred had we used the same accounting methodology in 2015 as we did in 2014. If we used the same market-based accounting methodology for our Scope 2 emissions in 2015 as in 2014, then this intensity figure would have decreased substantially more—by 11.5% (27.46 MTCO2e/FTE in 2015 as compared to 31.04 MTCO2e/FTE in 2014). This FTE employee intensity figure was calculated by taking our combined 2015 Scope 1 and market-based Scope 2 emissions divided by our average 2015 headcount.

Intensity figure =	Metric numerator (Gross global combined Scope 1 and 2 emissions)	Metric denominator	Metric denominator: Unit total	Scope 2 figure used	% change from previous year	Direction of change from previous year	Reason for change
0.242	metric tonnes CO2e	megawatt hour (MWh)		Market-based	23.37	Decrease	The primary reason for the decrease in our MWh intensity figure is emissions reduction activities associated with our aggressive procurement of renewables, which we significantly increased in 2015 as compared to 2014. As a large and complex multi-national company, it's impossible to determine the exact cause of emissions reductions, but we estimate that at least 50% of this decrease can be attributed to our additional procurement of renewables in 2015 (above that in 2014). In addition, we continue to deliver more and better services and products to more users using less energy and fewer emissions, as well as to operate our data centers and offices more efficiently (see: http://www.google.com/green/efficiency/). As mentioned in our response to CC12.2 above, the modification in our market-based Scope 2 accounting methodology as per the new GHG Protocol Scope 2 Guidance resulted in a slight increase in our combined Scope 1 and market-based Scope 2 emissions in 2015, which would not have occurred had we used the same accounting methodology in 2015 as we did in 2014. If we used the same market-based accounting methodology for our Scope 2 emissions in 2015 as in 2014, then this intensity figure would have decreased substantially more—by 29.1% (0.224 MTCO2e/MWh in 2015 as compared to 0.316 MTCO2e/MWh in 2014). This MWh intensity figure was calculated by taking our 2015 market-based Scope 2 emissions of our data centers divided by the 2015 electricity consumption at our datacenters.

Further Information

Page: CC13. Emissions Trading

CC13.1
Do you participate in any emissions trading schemes?

Yes

CC13.1a
Please complete the following table for each of the emission trading schemes in which you participate

Scheme name	Period for which data is supplied	Allowances allocated	Allowances purchased	Verified emissions in metric tonnes CO2e	Details of ownership
European Union ETS	Thu 01 Jan 2015 - Thu 31 Dec 2015	0	2172	2171	Facilities we own and operate

CC13.1b
What is your strategy for complying with the schemes in which you participate or anticipate participating?

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

CC13.2
Has your organization originated any project-based carbon credits or purchased any within the reporting period?

Yes

CC13.2a
Please provide details on the project-based carbon credits originated or purchased by your organization in the reporting period

Credit origination or credit purchase	Project type	Project identification	Verified to which standard	Number of credits (metric tonnes of CO2e)	Number of credits (metric tonnes CO2e): Risk adjusted volume	Credits cancelled	Purpose, e.g. compliance
Credit purchase	Landfill gas	Steuben County Landfill Gas Flaring Project (CAR452)	CAR (The Climate Action Reserve)	7429	7429	Yes	Voluntary Offsetting

Further Information

Page: CC14. Scope 3 Emissions

CC14.1
Please account for your organization's Scope 3 emissions, disclosing and explaining any exclusions

Sources of Scope 3 emissions	Evaluation status	metric tonnes CO2e	Emissions calculation methodology	Percentage of emissions calculated using data obtained from suppliers or value chain partners	Explanation
Purchased goods and services	Relevant, calculated	0	These emissions were estimated using life cycle inventory (LCI) and environmentally-extended input output (EEIO) datasets. For some goods and services, estimates were calculated using process-based data and conducting LCAs prepared in conformance with ISO14040. The quality of the estimate is likely moderate, given that as the LCI datasets and EEIO sector averages might not be fully representative of the technology and geography, there might be a lack of specificity in both the process-based data and in the EEIO methodology.		We are not breaking this data out specifically for business reasons. The total is included in the "Other" category below.
Capital goods	Relevant, calculated	0	For hardware manufacturing, we performed an analysis of hardware components added to our fleet using a streamlined model based on environmentally-extended input output (EEIO) data. To estimate data center construction emissions we used published construction emission data and applied 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.		We are not breaking this data out specifically for business reasons, to protect competitive information. Instead, we provide the value as part of the "Other" category below.

Sources of Scope 3 emissions	Evaluation status	metric tonnes CO2e	Emissions calculation methodology	Percentage of emissions calculated using data obtained from suppliers or value chain partners	Explanation
Fuel-and-energy-related activities (not included in Scope 1 or 2)	Not relevant, calculated	0			Emissions associated with fuel-and-energy-related activities are de minimis relative to our overall footprint
Upstream transportation and distribution	Not relevant, calculated	0			Emissions associated with upstream transportation and distribution are de minimis relative to our overall footprint
Waste generated in operations	Not relevant, explanation provided				Emissions associated with waste from our operations are expected to be de minimis relative to our overall footprint.
Business travel	Relevant, calculated	178808	We estimated business travel using data that includes the distance of each trip and the seating class for air travel and rail travel. We then applied the relevant emission factor provided in the CDP guidance. 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, assuming that the quality of the CDP-provided emissions factors is also high.		
Employee commuting	Relevant, calculated	118981	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. The quality of the estimate is probably moderate as we used a US-average commute distance given the lack of better data.		
Upstream leased assets	Relevant, calculated	15667	For onsite fuel consumption in leased buildings, we estimated our emissions by taking the square footage of our leased space and multiplying it by a standard office fuel usage and emissions factors from Commercial Buildings Energy Consumption Survey (CBECS), a government data source. Assuming that the CBECS emissions factor data is good, the quality of the estimate is likely moderate given that we have a robust internal real estate square footage tracking system.		
Downstream transportation and distribution	Not relevant, explanation provided				We have minimal downstream transportation and distribution activities, given that our business involves minimal physical delivery of any products or services. As a result, any associated emissions are de minimis in size.
Processing of sold products	Not relevant, explanation provided				We do not sell intermediate goods that require further processing.
Use of sold products	Not relevant, explanation provided				Given the small size of our product portfolio, emissions associated with use of sold products are expected to be de minimis relative to our overall footprint.
End of life treatment of sold products	Not relevant, explanation provided				Given the small size of our product portfolio, emissions associated with end of life treatment of sold products are expected to be de minimis relative to our overall footprint.
Downstream leased assets	Not relevant, explanation provided				We do not have any significant activity leasing assets to other organizations.
Franchises	Not relevant, explanation provided				We do not have franchises.
Investments	Not relevant, explanation provided				We have selected the "operational control" boundary method. We do not have any additional entities over which we exert operational control that are not already included in our inventory.
Other (upstream)	Not relevant, explanation provided				We are not breaking this data out specifically for business reasons, to protect competitive information. Instead, any emissions in this Other (upstream) category are provided as part of the "Other (downstream)" category below.
Other (downstream)	Relevant, calculated	921226	The methodology for tracking these emissions was described in previous line items, where we note in the explanation that the emissions are included in this "Other" category for business reasons.		As mentioned above, we are not breaking out most of the Scope 3 categories due to business reasons, to protect competitive information. This category includes both upstream and downstream emissions.

CC14.2
Please indicate the verification/assurance status that applies to your reported Scope 3 emissions

Third party verification or assurance process in place

CC14.2a
Please provide further details of the verification/assurance undertaken, and attach the relevant statements

Verification or assurance cycle in place	Status in the current reporting year	Type of verification or assurance	Attach the statement	Page/Section reference	Relevant standard	Proportion of reported Scope 3 emissions verified (%)
Annual process	Complete	Limited assurance	https://www.cdp.net/sites/2016/16/7616/Climate Change 2016/Shared Documents/Attachments/CC14.2a/CDP Verification Letter_Google CY2015_vFINAL.pdf	Pages 1 to 4	ISO14064-3	11

CC14.3
Are you able to compare your Scope 3 emissions for the reporting year with those for the previous year for any sources?

Yes

CC14.3a
Please identify the reasons for any change in your Scope 3 emissions and for each of them specify how your emissions compare to the previous year

Sources of Scope 3 emissions	Reason for change	Emissions value (percentage)	Direction of change	Comment
Employee commuting	Change in output	31	Increase	As our company grows, so do our employee commuting emissions. We continue to work to drive down these emissions through aggressive transportation programs designed to get employees out of single occupancy vehicles. Google shuttles and corporate electric vehicles result in net annual savings of 29,000+ metric tons of CO2, equivalent to taking 5,700 cars off the road or avoiding 87M vehicle miles every year. Google is committed to reducing single occupancy vehicle commuting in our Bay Area headquarters to 45%, transitioning our employees to shuttles, carpool, public transit, biking, and walking, and setting a new standard for vehicle reduction in a suburban office park.

CC14.4
Do you engage with any of the elements of your value chain on GHG emissions and climate change strategies? (Tick all that apply)

Yes, our suppliers
Yes, our customers
Yes, other partners in the value chain

CC14.4a
Please give details of methods of engagement, your strategy for prioritizing engagement and measures of success

Google's Supplier Code of Conduct addresses resource efficiency and other environmental indicators. This Supplier Code of Conduct is included in our contracts and forms the basis of our supplier sustainability profile survey and our supplier audits. We will be increasing our efforts in this area going forward. Our Supplier Code of Conduct can be found here: http://www.google.com/about/company/responsible-manufacturing.html
1. Description of engagement: We have integrated sustainability criteria into our supplier sourcing and supplier performance management processes. These sustainability criteria include assessments about a supplier's practices to report, manage and reduce their emissions (and other environmental indicators).
2. Strategy for prioritization and 3. how success is measured: We are continuing to analyze and refine our estimates of supply chain greenhouse gas emissions, while also requesting that suppliers report their targets and emissions tracking to us in our supplier sustainability profile survey. This data is used to prioritize by supplier, by commodity, and by region. Success is measured by the following methods: % of surveyed suppliers reporting that they track and report GHG emissions (>70%), % of surveyed suppliers reporting reduction targets (>65%) and the number of audited suppliers who have some environmental reduction or efficiency targets (>95%)

CC14.4b
To give a sense of scale of this engagement, please give the number of suppliers with whom you are engaging and the proportion of your total spend that they represent

Number of suppliers	% of total spend (direct and indirect)	Comment

CC14.4c
If you have data on your suppliers' GHG emissions and climate change strategies, please explain how you make use of that data

How you make use of the data	Please give details
Identifying GHG sources to prioritize for reduction actions	Many of our suppliers have robust programs to manage their greenhouse gas emissions. We work with our suppliers to understand their environmental impacts through surveys, onsite audits and direct engagement with our suppliers. Through our Supplier Code of Conduct, we have requirements for suppliers to drive resource efficiency and through our audits we gather data about their programs. We use the data we get from suppliers to help us validate the greenhouse gas emissions data obtained through our lifecycle assessment process and to help set goals for our supplier sustainability program. Our Supplier Code of Conduct can be found here: http://www.google.com/about/company/responsible-manufacturing.html

Further Information

Module: Sign Off

Page: CC15. Sign Off

CC15.1
Please provide the following information for the person that has signed off (approved) your CDP climate change response

Name	Job title	Corresponding job category
Joseph Kava	Vice President	Other: Vice President, Data Center Operations

Further Information

Module: ICT

Page: ICT1. Data center activities

ICT0.1a
Please identify whether "data centers" comprise a significant component of your business within your reporting boundary

Yes

ICT1.1
Please provide a description of the parts of your business that fall under "data centers"

We own and operate data centers around the world to keep our products running 24 hours a day, 7 days a week. As of Dec.31, 2015, Google owned and operated 15 large data centers across North America, South America, Europe, and Asia. To learn more about our data centers and their locations, see: https://www.google.com/about/datacenters/inside/locations/index.html

When people use Google products, the servers in our data centers do the work for them—around the clock and around the world. Our servers support many products at a time. That's "the cloud." By keeping our servers busy, we can do more with less—more searches, more Gmail, and more YouTube videos with fewer servers and less energy.

We've worked hard to minimize the environmental impact of these services so that when people use our products, they're also being good to the environment. Our data centers use 50% less energy than the typical data center. We raise the temperature to 80°F, use outside air for cooling, and build highly efficient custom servers. We also share detailed performance data to help move the entire industry forward.

Because of our energy efficiency efforts, our cloud is better for the environment. This means businesses that use our cloud-based products are greener too. Related specifically to Google products, by switching to Google Apps (PDF), companies have reduced office computing costs, energy use, and carbon emissions by 65% to 90%. Additionally, businesses that use Gmail (PDF) have decreased the environmental impact of their email service by up to 98% compared to those that run email on local servers.

To learn more about Google's data centers and how we drive efficiency, see: https://www.google.com/about/datacenters/efficiency/ and https://www.google.com/green/efficiency/datacenters/

ICT1.2
Please provide your absolute Scope 1 and 2 emissions and electricity consumption for the data centers component of your business

Business activity	Scope 1 emissions (metric tonnes CO2e)	Scope 2 emissions (metric tonnes CO2e)	Annual electricity consumption (MWh)	Electricity data collection method	Comment
Data centers					

ICT1.3
What percentage of your ICT population sits in data centers where Power Usage Effectiveness (PUE) is measured on a regular basis?

Percentage	Comment
100%	We measure and monitor PUE vigilantly and Google's data center staff have access to real-time data. Also, each quarter we publish PUE data on our public website. For more information, see: https://www.google.com/green/efficiency/datacenters/

ICT1.4
Please provide a Power Usage Effectiveness (PUE) value for your data center(s). You can provide this information as (a) an average, (b) a range or (c) by individual data center - please tick the data you wish to provide (tick all that apply)

Average

ICT1.4a
Please provide your average PUE across your data centers

Number of data centers	Average PUE	% change from previous year	Direction of change	Comment
	1.12	0	No change	The average annual PUE for our global fleet of data centers was 1.12 for 2015. Our PUE figures include data from facilities that meet our 5 MW threshold for reporting and have been in operation for at least 6 months, since these typically represent our stable operations. For more information on PUE of our data centers, see: http://www.google.com/about/datacenters/efficiency/internal/#tab0=1

ICT1.5
Please provide details of how you have calculated your PUE value

Green Grid, or Total Facility Power divided by IT Equipment Power

ICT1.6
Do you use any alternative intensity metrics to assess the energy or emissions performance of your data center(s)?

Yes

ICT1.6a
Please provide details on the alternative intensity metrics you use to assess the energy or the emissions performance of your data center(s)

In addition to monitoring the overall efficiency of the data center, we monitor the efficiency of each of the components that make up the data center infrastructure, as well as the efficiency of our ICT equipment. As a rule of thumb, we monitor energy in and energy out all along the power chain. If values go outside set parameters, we investigate the cause and set things right. For our ICT gear, we track utilization as well as work output per kilowatt hour.

ICT1.7
Please identify the measures you are planning or have undertaken in the reporting year to increase the energy efficiency of your data center(s)

Status in reporting year	Energy efficiency measure	Comment
Implemented	Other	We have conducted in-depth research on data center design to maximize energy efficiency. For more information, see: http://www.google.com/green/efficiency/datacenters/
Implemented	Other	We have implemented retrofits of lighting fixtures, controls, and sensors to minimize loads when critical data center spaces are not in active use.
Implemented	Other	We have many efficiency projects that are planned or in various stages of implementation. For more information, see our responses to questions 3.3a and 3.3b of the regular CDP questionnaire.

ICT1.8
Do you participate in any other data center efficiency schemes or have buildings that are sustainably certified or rated?

Yes

ICT1.8a
Please provide details on the data center efficiency schemes you participate in or the buildings that are sustainably certified or rated

Scheme name	Level/certification (or equivalent) achieved in the reporting year	Percentage of your overall facilities to which the scheme applies

Other: ISO 50001	Google has a strong commitment to environmental and worker health and safety and maintains corporate, multi-site external certifications to three standards: ISO 50001 Energy Management, ISO 14001 Environmental Management, and OHSAS 18001 Occupational Health and Safety Management. All three certificates apply to all of our owned and operated data centers in the United States, Europe, and Asia-Pacific. We are the only major internet services company to obtain and maintain all three of these certifications throughout their data center fleet. (See: http://www.youtube.com/watch?v=fhtp2tuQ9y0) In 2013, Google became the first company in North America to achieve a multi-site ISO 50001 energy management system (EnMS) certificate. In 2015, our external EnMS audit confirmed that we have a comprehensive EnMS at our data centers with a strong energy policy, a robust internal auditing program, ambitious energy performance improvement objectives and targets, and an effective program to continually monitor, assess, and respond to energy performance. (See: http://googlegreenblog.blogspot.com/2013/07/pushing-our-energy-performance-even.html and http://googlepolicyeurope.blogspot.com/2014/04/improving-our-data-centre-energy.html).	100%

ICT1.9
Do you measure the utilization rate of your data center(s)?

Yes

ICT1.9a
What methodology do you use to calculate the utilization rate of your data center(s)?

We monitor the utilization of IT resources such as server CPU and RAM, as well as the utilization of physical resources such as power and cooling capacity.

ICT1.10
Do you provide carbon emissions data to your clients regarding the data center services they procure?

Yes

ICT1.10a
How do you provide carbon emissions data to your clients regarding the data center services they procure?

In 2015, we updated Google's public green marketing website with our most recent carbon footprint (covering FY2014) (http://www.google.com/green/bigpicture/#/). We updated information about our renewable energy purchases, our CO2 footprint before offsets, and our zero CO2 footprint after offsets. We also calculated that, for a hypothetical active Google user, the CO2 emissions (before offsets) associated with one month of using Google services is roughly equivalent to the CO2 emissions from driving a car one mile. After you factor in our renewable energy and offsets, the CO2 footprint of using Google services is zero.

Information on Google's data centers and how we drive efficiency can also be found on the following two websites:
- Google Data Centers: Efficiency: https://www.google.com/about/datacenters/efficiency/index.html
- Our data centers: Designing efficient data centers: https://www.google.com/green/efficiency/datacenters/

In addition, Google has published or supported publicly available papers on the energy efficiency of digital services, including:
- 2011 Google paper on Gmail efficiency, '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 Google paper on Google Apps efficiency, '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
- 2013 Lawrence Berkeley National Laboratory paper on cloud software efficiency. This study was supported by Google, but the results are for generic cloud services that are not specific to Google. 'The Energy Efficiency Potential of Cloud-Based Software: A U.S. Case Study': http://crd.lbl.gov/assets/pubs_presos/ACS/cloud_efficiency_study.pdf

ICT1.11
Please describe any efforts you have made to incorporate renewable energy into the electricity supply to your data center(s) or to re-use waste heat

Google's goal is to power our operations with 100% renewable energy and we've made great strides towards this. In 2015, we procured enough renewable energy to cover 44% of our operations and we are currently the largest non-utility purchaser of renewable energy in the world. As of Dec 31, 2015, we've signed 15 contracts to purchase over 2 gigawatts of clean energy to green the electricity supply to our data centers, which is equivalent to taking over 1 million cars off the road. We continue to work on increasing our purchases of renewable energy. For more information, see our responses to questions 3.1d and 3.1e of the regular CDP questionnaire.

To achieve our goal, we're buying clean electricity directly from wind and solar farms around the world through Power Purchase Agreements (PPAs), and we're also working with our utility partners to make more renewable energy available to us and others through renewable energy tariffs and bilateral contracts. We hold ourselves to the highest standards when purchasing clean power. First, our contracts must create new sources of green power on the grid. Second, we purchase renewable energy in the same grid regions from which we're withdrawing power. And third, we purchase "bundled" energy and RECs, meaning the same quantity of energy and RECs at the same time.

For more details on our renewable energy purchases, see:
- Enumeration of our commitments to date and more information about each contract: http://www.google.com/green/energy/use/#purchasing
- Our white paper on PPAs: https://static.googleusercontent.com/external_content/untrusted_dlcp/www.google.com/en/us/green/pdfs/renewable-energy.pdf
- Our white paper on renewable energy tariffs: https://static.googleusercontent.com/media/www.google.com/en//green/pdf/renewable-energy-options.pdf
- Google Green Blog: Understanding Our Goal: What it Means to be Powered by 100% Renewable Energy: http://googlegreenblog.blogspot.be/2016/02/google-green-blog-what-it-means-to-be_8.html

At some of our data centers, we re-use waste heat from the servers to provide heat to the office building. Air from the hot aisles in the datacenter, which would normally be exhausted outside, is instead drawn over an air-to-air heat exchanger, where it is used to heat up incoming fresh air for the office area. In this way, no additional source of heat, such as a natural gas boiler, is required to heat the office building.

Further Information

Page: ICT2. Provision of network/connectivity services

ICT0.1b
Please identify whether "provision of network/connectivity services" comprises a significant component of your business within your reporting boundary

No

Further Information

Page: ICT3. Manufacture or assembly of hardware/components

ICT0.1c
Please identify whether "manufacture or assembly of hardware/components" comprises a significant part of your business within your reporting boundary

No

Further Information

Page: ICT4. Manufacture of software

ICT0.1d

Please identify whether "manufacture of software" comprises a significant component of your business within your reporting boundary

No

Further Information

Page: ICT5. Business services (office based activities)

ICT0.1e
Please identify whether "business services (office based activities)" comprise a significant component of your business within your reporting boundary

No

Further Information

Page: ICT6. Other activities

ICT0.1f
Please identify whether "other activities" comprise a significant component of your business within your reporting boundary

No

Further Information

CDP: [D][-,-][D2]