

October 6, 2021

To Stakeholders of Google Cloud Services:

3Degrees Group Inc. was engaged by Google to perform a review as described here, of the company's method for determining customer-specific greenhouse gas emissions associated with the usage of Google Cloud products.

BOUNDARIES

The method we reviewed was developed by Google to enable the company to provide each Google Cloud customer with an estimate of the greenhouse gas emissions resulting from that customer's use of Google Cloud products.

Google Cloud products represent the company's business-to-business compute, storage, database, and application-serving offerings provided via a worldwide network of data centers and related network infrastructure. As used here, Google Cloud products do not include Google-branded software-as-a-service products such as Google Workspace, Google search, and Google Chrome, nor does it include Google-related media and social network sites such as YouTube.

Google's customer-specific emissions method includes emissions arising from the following activities and infrastructure components as they relate to Google Cloud products:

- + Google Cloud Services electricity use, including that from Google-owned compute and networking equipment as well as ancillary electricity services such as cooling and lighting, whether inside a Google-owned data center or a facility owned by others
- + Upstream (cradle-to-gate) emissions associated with electricity generation facilities and fuels, for electricity loads in most geographies

The methodology excludes other emissions, including those arising from the following activities:

- + Upstream/downstream lifecycle emissions of data center equipment and buildings
- + Electricity generation that is subsequently lost during transmission and distribution
- + Diesel combustion for onsite backup power; fugitive emissions from refrigerants
- + Emissions arising from small equipment deployments at internet service providers
- + Google networking equipment deployed outside data centers

CRITERIA FOR REVIEW

The review used the *GHG Protocol Corporate Accounting and Reporting Standard* including its *Scope 2 Guidance* document (“GHG Protocol”). Additional references include the GHG Protocol’s *Corporate Value Chain Accounting and Reporting Standard* and its *Technical Guidance for Calculating Scope 3 Emissions*. Google’s customer-specific emission method uses the location-based scope 2 accounting method, as defined in the *Scope 2 Guidance* document.

SCOPE OF WORK

Google requested that we review the customer-specific emissions method for consistency with the GHG Protocol as noted above, as well as with our own professional view of the needs expressed by business customers when they seek emission disclosures from their suppliers.

3Degrees performed a detailed review in which we completed the following tasks:

- + Reviewed the method’s internal technical documentation
- + Reviewed a sample customer-specific emissions report including its user interface, help text, and user documentation
- + Reviewed an internal report which evaluated emission allocation methods Google might have employed and provided quantitative analyses on the relative performance of the methods
- + Evaluated the method for consistency with the GHG Protocol
- + Identified methodological choices which might introduce material error in the customer-specific calculation or which might be inconsistent with customer expectations
- + Identified instances where the draft user documentation was insufficiently clear or omitted important information
- + Interviewed Google team members regarding all issues identified
- + Reviewed the revised documentation for issue resolution
- + Conducted an 3Degrees-internal independent review of the project’s process, judgments, and conclusions.

EXCLUSIONS

Our review was limited to the sufficiency of (a) the calculation method as described in internal Google documentation, and (b) its disclosure to Google customers, as represented by the customer-specific footprint dashboard and report, its help text, and user documentation.

Some of the data streams used for the customer-specific emissions reports differ from the data sources used by Google in its annual third-party verified emissions report. The underlying

devices, processes, and systems which create these new data streams were not reviewed in the course of our work. We did not review or test Google’s deployment of the method to ensure that Google’s processes were consistent with the written method and performing as intended. As such, this review should not be construed as a verification or an assurance engagement.

CONCLUSIONS

Based on our review, we conclude that the method as described to us is a reasonable and appropriate means of calculating and allocating greenhouse gas emissions arising from Google Cloud products to individual customers per the GHG Protocol and typical customer expectations. In addition, we found that the user documentation is sufficiently clear and comprehensive to enable Google Cloud Services customers to make informed decisions as to their use of this data in their own greenhouse gas emission accounting, goal monitoring, and reporting.

We furthermore note that in our opinion, Google’s decision to use novel data sources for its customer-specific method reflects an appropriate tradeoff for Google and its customers. The data sources and processes have not been third-party verified, but their inclusion supports Google’s stated ambition to measure and manage its energy impacts on an hourly basis. They also establish a technical basis for assembling customer-specific carbon profiles via machine-level monitoring, a technique which fits the purpose of apportioning impact from a large-scale shared computing resource.

ABOUT 3DEGREES

3Degrees is a multi-faceted climate change solutions company serving Fortune 500 companies, utilities, and other organizations around the world. The 3Degrees team has deep expertise in sustainability consulting, environmental markets, renewable energy and carbon project development, transportation decarbonization solutions, and utility renewable energy programs. Together with our customers, 3Degrees helps develop and implement creative solutions that ensure environmental integrity and make good business sense. 3Degrees is a Delaware Public Benefit Corporation and a Certified B Corporation™.

This review was conducted by the following individuals:



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