

Impact Study

Germany Data Center

2024



Google's Data Center Impact in Germany

Google's data center in Germany is helping to rapidly grow the digital economy. It is what you rely on to pull up a map to a new restaurant, attend online classes, or access your healthcare records.

Google's digital infrastructure investments in Germany drive local economic development through job creation, promote environmental stewardship through carbon-free energy production, and foster thriving communities.

Since 2021, Google has invested more than [EUR 1B¹](#) in [Germany's digital infrastructure](#). This Impact Study provides a summary of key economic, environmental, and social metrics that Google's digital infrastructure investments have had on Germany.

Economic

Google's investments in digital infrastructure in Germany support jobs in construction, engineering, and the service industry.

Google's data center contribution to labor income in Germany is equal to supporting [~3,900 households in the country each year](#).

EUR ~484M²

Annual contribution to Germany's GDP³ (2021-2023)

~4,145

Annual jobs supported (2021-2023)

Environmental

As part of Google's commitment to operate all of its data centers using carbon-free energy by 2030. Google signed a [first-of-its-kind agreement](#) in Europe with ENGIE [to create a carbon-free energy portfolio on behalf of Google](#).

90% (2023) | 96% (2022)

Percentage of electricity matched with carbon-free energy^{4,5} supply at every hour of every day at Google's data center in Germany

Social

Google's community investments include support to the Brothers Grimm Vocational Academy's STEM⁶ program which helped empower ~100 students, [generating an EUR ~0.40⁷ social benefit for every Google-invested dollar](#) and fostering a more digitally skilled future workforce in Germany.

EUR ~200K⁸

Invested in Germany communities surrounding Google's data center between 2021 and 2023

This report provides a summary of Google's data center impact. The overall impact of all Google operations is significantly larger, encompassing contributions beyond data centers, including economic benefits from its platforms, products, and services used across various sectors.

Notes: 1. Equivalent to ~USD 1.1 Billion 2. Equivalent to ~USD 534 Million 3. GDP stands for gross domestic product. 4. Google defines carbon-free energy (CFE) as any type of electricity generation that doesn't directly emit carbon dioxide, including (but not limited to) solar, wind, geothermal, hydropower, and nuclear. Sustainable biomass and carbon capture and storage (CCS) are special cases considered on a case-by-case basis, but are often also considered carbon free energy sources. 5. Google's CFE is influenced by various factors, such as overall electricity usage, purchases of carbon-free energy, technological advancements, and changes in the broader energy landscape. 6. STEM stands for science, technology, engineering, and mathematics. 7. Equivalent to ~USD 0.4. 8. Equivalent to ~USD 210K.

Economic Impact: 2021-2023^{1,2}



EUR ~484M³

Annual Contribution
to Local GDP

Includes⁴ EUR ~229M direct, EUR ~144M indirect, and EUR ~111M induced



~4,145

Annual
Jobs Supported⁵

Includes ~380 direct jobs, ~2,565 indirect, and ~1,200 induced



EUR ~232M⁶

Annual
Labor Income

Includes⁷ EUR ~54M direct, EUR ~131M indirect, and EUR ~47M induced

Google's contribution to Germany's GDP increased by ~11% between 2021 and 2023, compared to the country's overall GDP growth of ~2% during the same period.

Google's data center contribution to direct, indirect, and induced labor income in Germany is equal to supporting ~3,900 households in the country each year.

Top GDP Contributions⁸



Professional, scientific, and technical services⁹

(21% of Total GDP Contribution from Google's investments in Germany)



Real estate
(21%)



Construction
(10%)

Spotlight: Carbon-Free Energy

Google's investments in clean energy in Germany have created...



EUR ~12M¹⁰

Annual
Contribution to
Local GDP



~80

Annual Jobs
Supported



EUR ~5M¹¹

Annual Labor
Income

Direct: includes Google employees and contractors (incl. their payroll and benefits) and annual spend on Google's suppliers

Indirect: includes Google's suppliers' employees and contractors, the suppliers' payroll and benefits due to Google orders, and suppliers spend

Induced: includes impact generated by the household spending of Google's employees and their suppliers in their local economies

Notes: 1. Numbers were converted into local currency using the average 2021-2023 exchange rate (IRS). 2. GDP and labor income rounded to the nearest one-million; Jobs and household numbers rounded to the nearest multiple of five. 3. Equivalent to USD ~534 Million. 4. Equivalent to USD ~252 Million direct, USD ~159 Million indirect, and USD ~122 Million induced. 5. Google's support to jobs includes construction, engineering, networking, renewable energy, jobs, security, and services, among others. 6. Equivalent to USD ~256 Million. 7. Equivalent to USD ~60 Million direct, USD ~144 Million indirect, and USD ~52 Million induced. 8. Top GDP contributions detail the three largest contribution areas and are not meant to total to 100%. 9. Includes computer systems, data processing, software services, and other computer-related facility management support, etc. 10. Equivalent to USD ~13 Million. 11. Equivalent to USD ~5.5 Million.

Environmental Impact: 2022 & 2023^{1,2}

90% (2023) vs. 64% (2023 Regional Grid)

96% (2022) vs. 56% (2022 Regional Grid)

24/7 Carbon-Free Energy (CFE)

Google has matched 100% of its global annual electricity consumption with renewable energy purchases, and has further committed to operating at 24/7 CFE by 2030. This means matching electricity demand with CFE supply every hour of every day.

Spotlight: Carbon-Free Energy

To advance Google's 24/7 CFE by 2030 goal, in 2021 Google signed a first-of-its-kind agreement in Europe with ENGIE to purchase clean energy to help ensure Google's operations in Germany operate at 80% CFE on an hourly basis or more.

As part of the agreement, ENGIE is creating a carbon-free energy portfolio on behalf of Google, purchasing electricity from various renewable energy projects in five German states.

Google's efforts will help to add additional carbon-free energy to the grid, as well as help extend the lifespan of existing projects who would otherwise have been dismantled.

Avg. Power Usage Effectiveness

Google's global data centers³ have an average power usage effectiveness (PUE) of 1.10, compared to the industry average of 1.58. This means that Google's global data centers are achieving an 83% reduction in overhead power usage. For every watt of power used to run servers and network equipment, only 0.10 watts are used to run supporting infrastructure like cooling and lighting.

Note: For the time period 2022-2023, Google does not have available data for its Germany data center given the facility began operations in 2023.

"Our long-standing data center efficiency efforts are important because our data centers represent the vast majority of our direct electricity use. Google's [global] data center consumption was more than 24 TWh in 2023 which translates to approximately 7-10% of global data center electricity consumption."

- 2023 & 2024 Google Environmental Reports

Cooling System

Google's data center in Germany is equipped with a hybrid cooling solution that optimizes energy efficiency by utilizing free cooling when ambient conditions are favorable and evaporative cooling when necessary.

Social Impact: 2021-2023¹



EUR ~200K²

Given to communities between 2021 and 2023

Surrounding Google's data center in Germany in addition to other Google.Org programs³



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Organizations supported between 2021 and 2023⁴

Focused on education, workforce, and community development, among other areas



EUR ~0.40⁵

Social benefit per Google-invested dollar⁶

Based on STEM educational program⁷

Google invested EUR ~200K² in Germany communities, including:

Bridging the Digital Divide

From 2022-2023, Google gave EUR ~100K⁸ to empower students and lifelong learners to enhance their STEM and digital skills, including:

- Helping Volkshochschule Hanau (VHS) purchase equipment for the digital learning competence center, an adult education center designed to further lifelong learning. VHS focuses on the large refugee and immigrant communities in Hanau.
- Supporting Brothers Grimm Vocational Academy (BGBA) in establishing a rapid prototyping lab, including 3D printers. The lab reaches ~100 students annually, generating the social benefit referenced above.

Supporting Career Development

Talented employees from a variety of skillsets and backgrounds are proud to call Google's data centers their place of work.

- They cite team diversity, culture, and career development opportunities as a few reasons for job satisfaction.
- As Niamh, an Environment, Health and Safety Manager put it, *"The Google Cloud data center in Hanau reflects my passion for the safety of people and the environment. I am excited to help protect operations, employees and our environment."*



"The generous donation from Google comes at the right time for us. By expanding the BGBA into the Stadthof (formerly Kaufhof), we are gaining space in which the rapid prototyping laboratory can be installed excellently."

- Prof. Martin Krämer, Director BGBA

Notes: 1. Numbers were converted into local currency using the average 2022-2023 exchange rate and rounded to the nearest ten thousand. 2. Equivalent to USD ~210K. 3. The amounts listed are in addition to other Google programs, like Grow with Google, Google.Org's Impact Challenge, and other initiatives. 4. The data center, still in its early stages, is working to increase the number of organizations supported, in addition to the 10+ organizations already supported by Google.Org. 5. Equivalent to USD ~0.4. 6. This calculation is directional and represents Google's step toward understanding social value associated with its community investments. 7. Calculation based on Brothers Grimm Vocational Academy (BGBA) program. 8. Equivalent to USD ~105K.



The Google Differentiator

Google recognizes that its data center operations and value chain can be engines of economic, environmental, and social progress. Google aims for its investments to catalyze positive spillover effects within Germany.

Google thinks about its investments holistically.

Google recognizes that it can catalyze greater impact when it looks at its economic, environmental, and social efforts collectively, which is why Google's 2024 Impact Study in Germany articulates Google's impact across these three domains. As Google considers its future strategy in Germany, it will continue to look for opportunities to keep digital infrastructure secure and sustainable while driving local economic development, fostering thriving communities, and spurring environmental stewardship.

Google seeks to harness AI to drive innovation and accelerate climate action.

Google continues to invest in state-of-the-art infrastructure to support its artificial intelligence (AI) efforts and rapidly grow the digital economy in Germany. However, Google recognizes that these benefits also come with increased energy usage and emissions and might have unintended consequences if not properly managed. As part of its AI for Sustainability strategy, Google is taking steps to use AI to accelerate climate progress and through its AI Opportunity Agenda, Google is providing recommendations for governments to amplify the positive impacts of AI for the broadest possible range of people.

Google seeks to engage directly with community members to advance and measure impact.

Google continues to work closely with community members in Germany to understand its impact and refine its strategy. This report represents a step toward measuring impact as Google moves from measuring inputs to measuring impact and value. This includes Google's approximation of a "social return on investment", intended to estimate the social value created per Google-invested dollar based on educational empowerment and future job opportunities. Google will continue to find ways to be more transparent and articulate its impact to local communities across all dimensions.

Thank you!

To the many community members and Googlers who strive to make Google's ambitious economic, environmental, and social goals a reality.

For additional information or any questions please reach out to:

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DISCLAIMER: This Impact Study was prepared by Deloitte Consulting LLP ("Deloitte") for Google LLC ("Google") during Fall 2024. The purpose of the study is to assess the economic, environmental, and social impacts of Google's data centers modeled from the years of 2021-2023. The modeling, analysis, and results shown as part of the impact are based on information provided directly by Google LLC, publicly available information, and third-party information. Any revisions to those data will affect the assessments shown as part of the study. To calculate economic impacts, this study used an input-output model developed by IMPLAN. In preparing this study, Deloitte has, without independent verification, relied on the accuracy of information made available by Google.