

Impact Study

Denmark Data Center

2024



Google's Data Center Impact in Denmark

Google's data center in Denmark 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 Denmark drive local economic development through job creation, promote environmental stewardship through carbon-free energy production, and foster thriving communities.

Since 2018, Google has invested more than **DKK ~4,450M^{1,2}** in Denmark'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 Denmark in recent years.

Economic

Google's investments in digital infrastructure in Denmark support jobs in construction, engineering, and the service industry. Google's data center contribution to labor income in Denmark is equal to supporting **~1,510 households in the country each year.**

DKK ~785M³

Annual contribution to Denmark's GDP⁴ (2021-2023)

~760

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 had **over 160 MW worth of operational renewable energy contracts from five Danish solar farms** in Denmark at the end of 2023.

92% (2023) | 90% (2022)

Percentage of electricity matched with carbon-free energy^{5,6} supply at every hour of every day at Google's data center in Denmark

Social

Google's community investments include support to the Bülows MakerSpace's STEM⁷ program which helped empower 2,000 students, **generating a DKK ~35.30⁸ social benefit for every Google-invested dollar** and fostering a more digitally skilled future workforce in Denmark.

DKK ~3.70M⁹

Invested in Denmark communities surrounding Google's data center in 2022 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. Investment figure was converted into local currency using the average 2021-2023 exchange rate. 2. Equivalent to USD ~660 Million. 3. Equivalent to USD ~116 Million. 4. GDP stands for gross domestic product. 5. 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. 6. 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. 7. STEM stands for science, technology, engineering, and mathematics. 8. Equivalent to USD ~5. 9. Equivalent to USD ~530K.

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



DKK ~785M³

**Annual Contribution
to Local GDP**

*Includes⁴ DKK ~368M direct, DKK
~235M indirect, and DKK ~182M
induced*



~760

**Annual
Jobs Supported⁵**

*Includes ~140 direct jobs, ~440
indirect, and ~170 induced*



DKK ~402M⁶

**Annual
Labor Income**

*Includes⁷ DKK ~123M direct, DKK
~209M indirect, and DKK ~70M
induced*

Google aspires to increase its contribution to Denmark's GDP by supporting the growth of the country's digital economy and digital infrastructure goals.

Google's data center contribution to direct, indirect, and induced labor income in Denmark is equal to supporting ~1,510 households in the country each year.

Top GDP Contributions⁸



**Professional, scientific, and technical
services⁹**

**(25% of Total GDP Contribution
from Google's investments in
Denmark)**



**Manufacturing
(12%)**



**Utilities
(10%)**

Spotlight: Carbon-Free Energy

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



DKK ~7M¹⁰

**Annual
Contribution to
Local GDP**



~25

**Annual Jobs
Supported**



DKK ~2M¹¹

**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 ~116 Million. 4. Equivalent to USD ~54 Million direct, USD ~35 Million indirect, and USD ~27 Million induced. 5. Google's support to jobs includes construction, engineering, networking, renewable energy jobs, security, and services, among others. 6. Equivalent to USD ~59 Million. 7. Equivalent to USD ~18 Million direct, USD ~31 Million indirect, and USD ~10 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 ~1 Million. 11. Equivalent to USD ~300K.

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

92% (2023) vs. 86% (2023 Regional Grid)

90% (2022) vs. 82% (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.

1.10 (2023)

1.12 (2022)

vs. 1.58 (industry average)

Avg. Power Usage Effectiveness

Compared to the industry average, Google's Denmark data center is 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.

Spotlight: Carbon-Free Energy

To advance Google's 24/7 CFE commitment, Google had over 160 MW worth of operational renewable energy contracts from five Danish solar farms in Denmark at the end of 2023.

Three of the projects will be developed by Better Energy, with the remaining two developed by European Energy. One of the solar projects, a 41 MW facility near Næstved, will be the country's first zero-subsidy solar farm, showcasing that renewable energy is becoming competitive with the cost of power from the grid.

"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

78.4M Liters (2023)

72.7M Liters (2022)

Water Consumption

The amount of water used is equivalent to irrigating less than one golf course annually in both 2023 and 2022. Google strives to protect water quality and ecosystem health in the communities where it operates, including Denmark.³

Sustainability Spotlight

In 2023, Google, in conjunction with Danfoss, Microsoft, Schneider Electric, and the Danish Data Center Industry, launched the Net Zero Innovation Hub for Data Centers. Located in Denmark, the pan-European consortium works to foster collaboration across industries in order to achieve decarbonization while stabilizing the grid.

Notes: 1. For more information on the environmental statistics, refer to the 2023 & 2024 Google Environmental Reports. 2. As applicable, the water consumption represents total water consumption across all data centers in the country; CFE and PUE are averages across data centers. 3. Google seeks to replenish 120% of the freshwater volume it consumes, on average, across its offices and data centers by 2030.

Social Impact: 2022 & 2023¹



DKK ~3.70M²

Given to communities
in 2022 and 2023

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



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Organizations supported
in 2022 and 2023

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



DKK ~35.30⁴

Social benefit per
Google-invested dollar⁵

*Based on STEM educational
program⁶*

Google invested DKK ~3.70M² in Denmark communities, including:

Preserving History

Google's support for Fredericia's Living Tiny Town and the Fredericia Museum has helped preserve the town's cultural history.

- The Living Tiny Town began as an employment project for those with permanent disabilities and has evolved into an 850-home historic figure reconstruction of Fredericia from 1849 built on a 1:10 ratio.
- Google's technology investment of DKK ~1.38M⁷ allows visitors to experience Fredericia through augmented reality binoculars and built-in speakers - leveraging Google Maps.
- As Karsten Merrald Sorensen, Museum Director, put it, "*This means that we make [the exhibitions] more alive and interacting, so it becomes an immediate communication boost...Somehow you step into history while you are there.*"

Career Exploration

From 2019-2020, Google gave DKK ~1.49M⁸ to support Fredericia Maskinmesterskole's development of a mini data center, allowing students to experience what it is like to work as a data center machinist.

- The six-rack data center and cooling system allows students to gain hands-on mechanical experience by solving problems around optimizing power consumption or energy usage.

STEM Programming

In 2023, Google gave DKK ~550K⁹ to Bülows MakerSpace to train teachers and empower students in STEM training.

- Through the program, 2,000 local students received access to technology training on robots, 3D printing, and virtual reality, generating the social benefit referenced above.

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 ~530K. 3. The amounts listed are in addition to other Google programs, like Grow with Google, Google.Org's Impact Challenge, and other initiatives. 4. Equivalent to USD ~5. 5. This calculation is directional and represents Google's step toward understanding social value associated with its community investments. 6. Calculation based on Bülows MakerSpace program. 7. Equivalent to USD ~198K. 8. Equivalent to USD ~214K. 9. Equivalent to USD ~79K.

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 Denmark.

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 Denmark articulates Google's impact across these three domains. As Google considers its future strategy in Denmark, 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 Denmark. 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 Denmark 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.