Impact Study

Singapore Data Center

2024

Google

Deloitte.

Google's Data Center Impact in Singapore

Google's data centers in Singapore are helping to rapidly grow the digital economy. They are 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 Singapore drive local economic development through job creation, promote environmental stewardship through carbon-free energy production, and foster thriving communities.

Since 2011, Google has invested more than SGD ~6.7B[1,2] in Singapore'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 Singapore in recent years.

Economic

Google's investments in digital infrastructure in Singapore support jobs in construction, engineering, and the service industry. Google's data center contribution to labor income in Singapore is equal to supporting ~3,280 households in the country each year.

SGD ~1,292M[3]

Annual contribution to Singapore's GDP[4] (2021-2023)

~10,505

Annual jobs supported (2021-2023)

Environmental

As part of Google's commitment to operate all of its data centers using carbon-free energy (CFE) by 2030, Google formed a 10-year partnership with PacificLight Energy and Rexus Bionergy to source renewable energy from REXus' Waste Wood-to-Energy plant and supply it to its Singapore data centers.

4% (2023) | 4% (2022)

Percentage of electricity matched with carbon-free energy[5,6] supply at every hour of every day at Google's data centers in Singapore

Social

Google's community investments include support to the United Women Singapore's Girls2Pioneers Program which helped empower girls to pursue STEM[7] careers, generating a SDG ~0.70[8] social benefit for every Google-invested dollar and fostering a diverse future workforce in Singapore.

SGD ~890K[9]

Invested in Singapore communities surrounding Google's data centers 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 ~5 Billion. 3. Equivalent to USD ~953 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 ~0.50. 9. Equivalent to USD ~654K.

Economic Impact: 2021-2023[1,2]

SGD ~1,292M[3]

Annual Contribution to Local GDP

Includes[4] SGD ~470M direct, SGD ~554M indirect, and SGD ~268M induced

~10,505

Annual Jobs Supported[5]

Includes ~645 direct jobs, ~7,255 indirect, and ~2,605 induced

SGD ~580M[6]

Annual Labor Income

Includes[7] SGD ~137M direct, SGD ~343M indirect, and SGD ~101M induced

Google's contribution to Singapore's GDP increased by ~32% between 2021 and 2023, compared to the country's overall GDP growth of ~7% during the same period.

Google's data center contribution to direct, indirect, and induced labor income in Singapore is equal to supporting ~3,280 households in the country each year.

Top GDP Contributions[8]

Professional, scientific, and technical services[9]

(19% of Total GDP Contribution from Google's investments in Singapore)

Wholesale Trade

(11%)

Construction

(10%)

Spotlight: Subsea Cable

Google's global cable infrastructure extends into Singapore, including Echo, the first-ever cable to connect the US to Singapore. In fact, Google's APAC network infrastructure generated 1.1M additional jobs and SGD 583B[10] in aggregate GDP for the APAC region between 2010 and 2019.

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 ~953 Million. 4. Equivalent to USD ~347 Million direct, USD ~409 Million indirect, and USD ~198 Million induced. 5. Google's support to jobs includes construction, engineering, networking, renewable energy jobs, security, and services, among others. 6. Equivalent to USD ~428 Million. 7. Equivalent to USD ~101 Million direct, USD ~253 Million indirect, and USD ~74 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 ~430 Billion.

Environmental Impact: 2022 & 2023[1,2]

4% *(2023)* vs. 4% *(2023 Regional Grid)*
4% *(2022)* vs. 4% *(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.

1.16 *(2023)*
1.17 *(2022)*
vs. 1.58 *(industry average)*

Avg. Power Usage Effectiveness

Compared to the industry average, Google's Singapore data centers are achieving a 72% reduction in overhead power usage. For every watt of power used to run servers and network equipment, only 0.16 watts are used to run supporting infrastructure like cooling and lighting.

Spotlight: Carbon-Free Energy

To advance Google's 24/7 CFE commitment, in 2024 Google has formed a 10-year partnership with PacificLight Energy (PLE) and Rexus Bionergy (RExus) to offtake renewable energy from RExus' Waste Wood-to-Energy plant and supply it to Google's Singapore data centers.

The plant will use waste wood from horticultural or logistics activities and turn it into energy – with an estimated 10% higher efficiency than conventional waste to energy plants in Singapore. The plant will also have a pilot-scale carbon capture system for downstream utilizations.

"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

Spotlight

Singapore Water Efficiency Award

Google selected as awardee in 2024, recognized for its efficient operations, including the use of recycled water for cooling. Google strives to protect water quality and ecosystem health in the communities where it operates, including Singapore.[3]

Sustainability Spotlight

Google participated in two events at Singapore International Energy Week: the Energy Insights panel and the TechTable session. Both showcased Google's energy thought leadership and pledge to achieve 24/7 carbon-free energy in the Asia Pacific region.

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 & 2023[1]

SGD ~890K[2]

Given to communities in 2022 and 2023

Surrounding Google's data centers in Singapore in addition to other Google.Org programs[3]

23

Organizations supported in 2022 and 2023

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

SGD ~0.70[4]

Social benefit per Google-invested dollar[5]

Based on STEM educational program[6]

Google invested SGD ~890K[2] in Singapore communities, including:

Water Management

Since 2023, Google has given SGD ~340K[7] to help the Singapore government create an "Eco-Pond" to harvest rainwater and provide stormwater management.

- The project is expected to capture 2.6 million gallons of rainwater per year.
- The rainwater will be treated and used for non-potable uses, such as watering plants and washing common areas.
- The Eco-Pond will:
  - Provide a community garden and pet area for residents
  - Serve as a location for school tours focused on green infrastructure.

STEM Programming

Between 2021 and 2022, Google provided SGD ~120K[8] to United Women Singapore's Girls2Pioneers program to empower girls to pursue STEM careers.

- The funding in 2022 supported 100 girls between 10-21 years old.
- Participants explored STEM careers through Girl2Pioneers interventions including STEM@Home activities, field trips, and career panels.
- Google's support helped generate the social benefit reference above based on estimated long-term outcomes from STEM engagement.

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 ~654K. 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 ~0.50. 5. This calculation is directional and represents Google's step toward understanding social value associated with its community investments. 6. Calculation based on Girls2Pioneers program. 7. Equivalent to USD ~250K. 8. Equivalent to USD ~90K.

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 Singapore.

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