AWS Economic Impact Study

AWS Investment in Switzerland
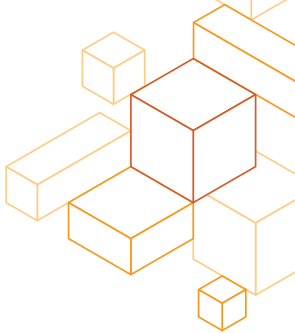
Contents

Executive Summary

5.9 billion Swiss francs[1]	**16.3 billion Swiss francs**	**Over 2,500 Jobs**
Total Capital and Operational Investment Associated with the AWS Europe (Zurich) Region from 2022-2036	Gross Domestic Product (GDP) Contributed to Switzerland by the AWS Europe (Zurich) Region from 2022-2036	Average Annual Full-Time Jobs with External Businesses Supported by the AWS Europe (Zurich) Region from 2022-2036

In 2022, Amazon Web Services (AWS) launched the AWS Europe (Zurich) Region, along with a 15-year plan to expand related infrastructure and operations in Switzerland through 2036. The AWS Europe (Zurich) Region provides AWS customers with the ability to store their data locally and solve critical low latency challenges through cutting-edge cloud technology. AWS customers storing their data in the AWS Europe (Zurich) Region or in any AWS Region around the world can offer applications that require low latency to their end users, such as machine learning (ML), augmented/virtual reality (AR/VR), real time monitoring, and video content delivery.

AWS complies with the most rigorous international security standards, which enables customers to scale data protection and compliance with their business. By delivering a local and secure option to store data, the local infrastructure equips AWS customers with an additional level of control and enables those supporting regulated industries to comply with Swiss laws and local regulations.

The construction and operation of AWS infrastructure in the country supports billions of Swiss francs in revenue at businesses in the AWS supply chain, and resulting compensation paid to workers in skilled technical, and information technology (IT) roles. AWS further invests in cloud workforce and education programs to grow the cloud ecosystem in Switzerland. The AWS economic impact methodology that quantifies these effects uses Amazon company financial projections, the input-output methodology, and statistical tables provided by Switzerland's Federal Statistical Office (FSO).

This study estimates the following key benefits:

- AWS plans to **invest 5.9 billion Swiss francs in the AWS Europe (Zurich) Region from 2022-2036**, including both capital and operating expenditures associated with constructing, maintaining, operating, and developing the AWS Region in Switzerland. This investment includes all cash expenses directly attributable to the project, such as imports of highly specialized and proprietary equipment and software, and in-country spending on construction and data center operations.

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[1] The local currency values in this report were obtained by using the October 17, 2022 spot exchange rate of 1.0043 Swiss francs (CHF) per US dollar. At the time of publication, the total capital and operational planned investment value is 5.9 billion USD, and contribution to GDP is 16.3 billion USD.

- AWS estimates investment associated with this Region will contribute **16.3 billion Swiss francs to the GDP of Switzerland between 2022 and 2036**. The GDP contribution includes value added by AWS to Switzerland's IT sector and in-country spending on goods and services related to the construction and operation of AWS data centers.

- AWS estimates that AWS investment between 2022 and 2036 will support an annual average of over **2,500 full-time jobs at external vendors** in the Swiss data center supply chain. This will impact many sectors across the data center supply chain, such as telecommunications, nonresidential construction, electricity generation, facilities maintenance, and data center operations.

- AWS runs its business in the most environmentally friendly way possible by investing in energy-efficient infrastructure. **AWS infrastructure is up to five times more energy efficient than the average European enterprise data center**, and migrating one megawatt (MW) of typical workloads from a typical European organization's data center to AWS reduces carbon emissions by as much as 1,079 metric tons of CO_2 a year.
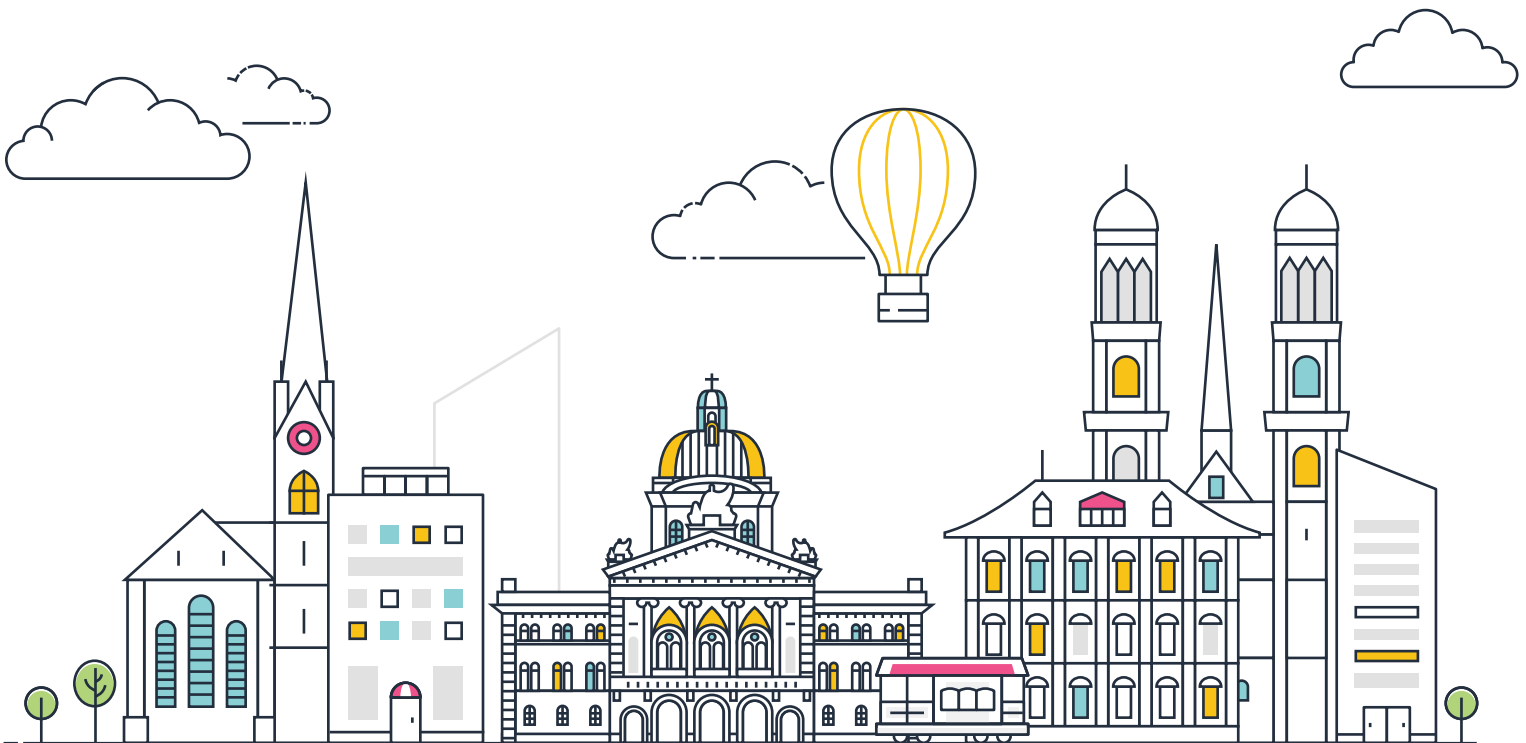
AWS **Overview**
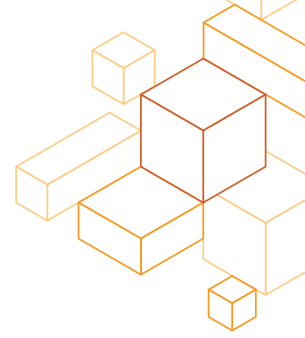
Cloud computing is the on-demand delivery of IT resources over the internet. Instead of buying, owning, and maintaining servers, customers access computing power, data storage, and other services from a cloud provider like AWS. AWS offers pay-as-you-go pricing, which means that the customer only pays for the resources used instead of the traditional IT model, where these expenses come as a fixed cost. Organizations of every type, size, and industry use the cloud for various use cases, such as data backup and recovery; software development and testing; data analytics; enterprise resource planning; email; virtual desktops; contact centers; and customer-facing web services.

Cloud computing users have access to a broad range of the latest technologies, so they can innovate faster, experiment freely, and quickly spin up resources as needed. They do not have to over-provision resources upfront to handle peak levels of business activity in the future. Instead, they provision only the resources they need. AWS is the world's most comprehensive and broadly adopted cloud provider, offering over 200 fully featured services from data centers globally. Millions of customers—ranging from startups to large enterprises and public sector organizations—use AWS to lower costs, increase agility, and innovate faster.

AWS helps customers launch and grow their businesses. Access to cloud computing lowers the cost of starting new businesses, encourages innovation, and spurs development of new technologies. It also attracts more funding for startups, which generates further economic growth. Researchers from Harvard University and Massachusetts Institute of Technology (MIT) found that AWS lowers the cost of starting new businesses by 15–27 percent. Their study affirms that "many practitioners see the introduction of cloud computing services by Amazon as a defining moment that dramatically lowered the initial cost of starting internet and web-based startups."[2]

In addition to economic gains, replacing in-house computing with cloud technology is also better for the environment. In 2019, Amazon co-founded The Climate Pledge. As part of the Pledge, Amazon, and over 300 other signatory businesses, have committed to be net-zero carbon across their business by 2040, 10 years ahead of the Paris Agreement. As a result, Amazon is on a path to powering its operations with 100 percent renewable energy by 2025—five years ahead of its original target of 2030. AWS contributes toward these goals by constantly improving the energy efficiency of its computing resources and by increasing the share of renewable energy in total consumption by its data centers. As a result, the carbon footprint of cloud computing with AWS is much lower than that of in-house and most other data center providers. By adopting AWS technology, private and public sector organizations can take advantage of the energy efficiency and clean energy goals of AWS while meeting their own computing needs.

[2] Ewens M, Nanda R, Rhodes-Kropf M. *Cost of Experimentation and the Evolution of Venture Capital*. NBER Publications. National Bureau of Economic Research, 2018.
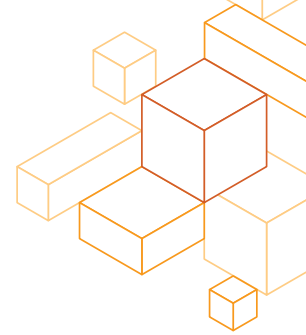
AWS in **Switzerland**

More than 10,000 active customers in Switzerland use AWS technology to innovate, accelerate their business, and develop new activities. Additionally, numerous Swiss public sector organizations use AWS technology to power their digital transformation, scale their impact, and help Swiss citizens adapt and persevere through major global events. AWS has the largest and most dynamic community of users, with millions of active customers every month and more than 100,000 Partners from over 150 countries.

The AWS Partner Network
The AWS Partner Network (APN) helps AWS customers build, migrate, and accelerate their business in the cloud. The APN indirectly supports employment at over 150 AWS Partners in Switzerland. Over a third of AWS Partners are headquartered in Switzerland, making services easily accessible for AWS customers in the country. The APN helps AWS Partners build innovative solutions and services on AWS for their customers and end users by providing partners with access to a dedicated portal, business and technical support and training, as well as benefits.

Upon joining the APN, AWS Partners can enroll in the Partner Path that best aligns with their organization to validate their offerings and demonstrate their AWS expertise. AWS Partner Paths provide support for organizations that develop software that runs on AWS; develop hardware devices that work with AWS; deliver consulting and professional services; sell, deliver, or incorporate AWS training; and recruit, onboard, and support their partners to resell and develop AWS technologies.

AWS Partners help customers of all segments and sizes, from startups to enterprises, migrate to AWS, deploy applications, and provide a full range of support for customers' AWS environments.

Aare Seeland mobil AG
Swiss transport company Aare Seeland mobil AG is committed to delivering excellent customer service. To meet their customer service vision, they invest in modern facilities, new vehicles, and a reliable information system to ensure that their customers travel in comfort. However, the company's on-premises infrastructure was a challenge for growth. Aare Seeland mobil AG collaborated with AWS Partner, SoftwareONE, to modernize their infrastructure as well as plan and pilot a migration of their data and local applications to AWS.

Aare Seeland mobil AG wanted to reduce the high investment costs for on-premises infrastructure. An initial business case was built using AWS Optimization and Licensing Assessment (AWS OLA), which is a program that assesses and optimizes current on-premises and cloud environments. AWS OLA is based on actual resource use, third-party licensing, and application dependencies.

Supported by expert analysis from SoftwareONE, this process measured Aare Seeland mobil AG's systems usage and identified idle instances to help save costs. SoftwareONE also used the AWS Migration Evaluator to discover overprovisioned on-premises hardware and to suggest AWS technologies that are estimated to meet or exceed those requirements at a lower cost.

Overall, the analysis projected 30 percent in cost reductions for Aare Seeland mobil AG to move from on-premises infrastructure to AWS. SoftwareONE also helped the company build an environment tailored to its flexible usage demands using AWS Organizations, which helps centrally manage and govern environments as a company grows and scales AWS resources.

Lausanne Hockey Club

Lausanne Hockey Club's (LHC) ticket earnings fell by 28 percent due to the COVID-19 pandemic. LHC also moved stadiums three times during the pandemic. The club decided it needed a new ticketing platform to reengage with fans, increase sales, and revive its business. LHC installed a solution from SecuTix, running on AWS, and working with AWS Partner ELCA Cloud Services. Using a modular approach for greater flexibility and ease of integration, SecuTix developed a unique ticketing system for LHC, which relied on Amazon EC2 and Amazon S3 to handle peak traffic in a more efficient and cost-effective manner.

LHC improved fan engagement through a better ticketing experience, and by deploying a new ticketing platform in five weeks. In addition, LHC offered fans secure, mobile ticketing options.

Job Creation in Switzerland

Teams of Amazon employees support AWS customers and partners across Switzerland from offices in Geneva, Zurich, and Bern. Amazon employees include the operations technicians and engineers that support AWS infrastructure. Positions also include solutions architects, sales representatives, business developers, software developers, and professional services consultants.

AWS Locations in Switzerland
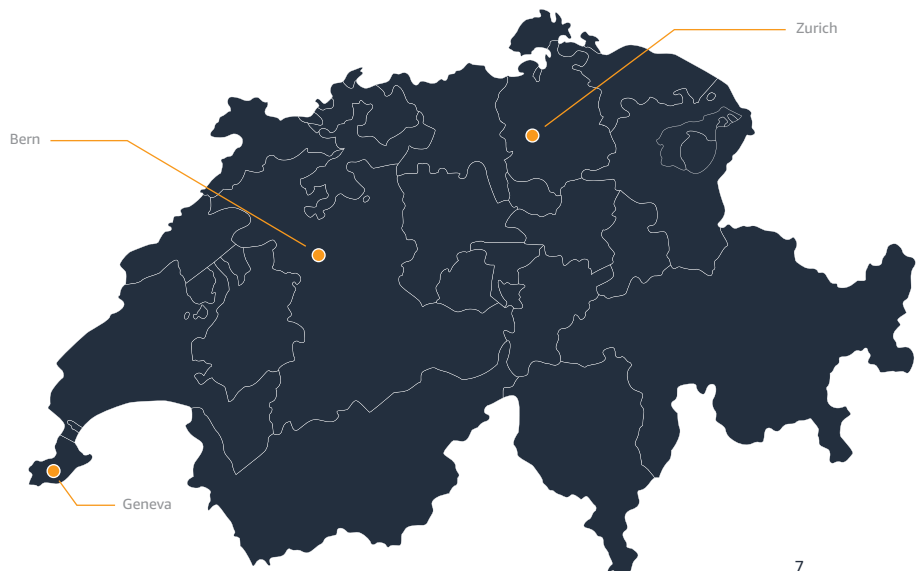
Amazon Offices:
Geneva, Zurich, Bern

AWS Region:
Europe (Zurich)

AWS Direct Connect:
Zurich

AWS Edge Network:
Zurich

Zurich

Bern
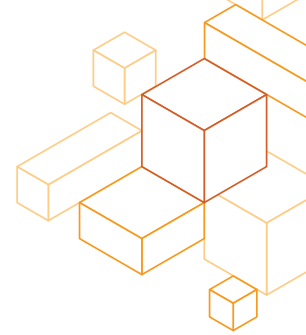
Geneva

AWS Network Services and
Infrastructure in Switzerland

The launch of the AWS Europe (Zurich) Region adds value through AWS's history of continued investment in infrastructure, network services, and corporate operations in Switzerland.

2017 Investment

AWS established its first Point of Presence (PoP) in Switzerland in 2017 when it opened an Amazon CloudFront edge location in the Zurich region. Edge network locations enable customers to access its CloudFront, Amazon Route 53, Origin Shield, and Web Application Firewall (WAF) services. Together, these applications work seamlessly to securely deliver data without interruption. In 2017, AWS also launched an AWS Direct Connect location in Zurich, which enables customers to establish private connectivity between AWS and their data center, office, or colocation environment.
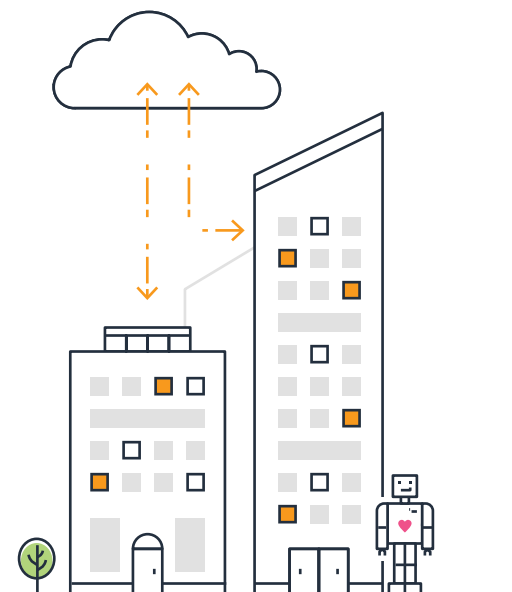
2019 Investment

In 2019, AWS established its second PoP in the Zurich region. AWS brought AWS Outposts to Switzerland in December 2019, enabling local customers to run AWS compute, storage, database, and other services on-premisess. AWS Outposts deliver fully managed and configurable compute and storage servers and server-racks built with AWS-designed hardware that enable AWS customers to build and run applications using the same programming interfaces as in AWS Regions, while using local compute and storage resources for lower latency and local data processing needs.

2022 Investment

The AWS Europe (Zurich) Region launched in 2022 and has three Availability Zones (AZs). AWS Regions are physical locations around the world with multiple, isolated, and physically separate AZs, or clusters of logically connected data center infrastructure, in a geographic area. AZs are typically separated by up to 100 kilometers to mitigate the impact of the most common disasters that could affect data centers.

The multiple AZ design of every AWS Region offers advantages for customers. Each AZ has independent power, cooling, and physical security, and is connected by AWS custom-built and operated network infrastructure. AWS customers focused on high availability can design their applications to run across multiple AZs to achieve even greater reliability.

Economic Impact of AWS
# **Investment in Switzerland**
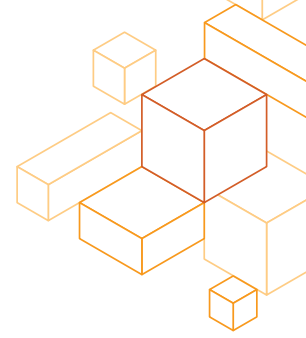
AWS plans to i**nvest 5.9 billion Swiss francs in the AWS Europe (Zurich) Region from 2022-2036** as AWS builds, maintains, operates, and develops data centers to support the projected growth in demand for AWS technologies by its customers. This investment includes all cash expenses directly attributable to its Region, such as imports of highly specialized and proprietary equipment and software, and in-country (local) spending.

Local spending includes capital expenditures (CAPEX) on construction labor, materials, and services, as well as millions of Swiss francs in recurring operating expenditures (OPEX), such as compensation for employees and contractors, utility fees, and facilities and rental costs. AWS plans on progressively expanding infrastructure and growing corporate operations to meet projected demand for AWS technology in Switzerland and across Europe.

This study estimates that the planned investment associated with the AWS Europe (Zurich) Region will **contribute 16.3 billion Swiss francs to the GDP of Switzerland from 2022-2036** using Amazon financial projections, the established input-output methodology,[3] and statistical tables provided by FSO. GDP contributed by the AWS Europe (Zurich) Region includes the value added by AWS services to the IT sector in Switzerland, as well as the direct, indirect, and induced effects of AWS purchases from the Swiss data center supply chain. This study estimates that the in-country portion of AWS investment will **support an average of over 2,500 full-time jobs annually at external businesses in Switzerland from 2022–2036**. Estimates of the average number of these jobs include:

- **Over 400 jobs annually sustained by the Direct Effects** — These are jobs at AWS suppliers that are directly supported by AWS investment, which are in sectors such as non-residential construction, software development, facilities maintenance, electricity generation and telecommunications.

- **Over 500 jobs annually sustained by the Indirect Effects** — These jobs are in the AWS supply chain that are indirectly supported by business-to-business transactions resulting from AWS investment. These include jobs in sectors that supply the skilled labor and services needed to fulfill work for AWS.

- **Over 1,600 jobs annually sustained by the Induced Effects** — These are jobs in the broader Swiss economy supported by the household consumption of workers receiving compensation from AWS and the AWS supply chain. These include jobs in sectors that supply consumer goods and services to Swiss households.

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[3] See Appendix A for details of the methodology
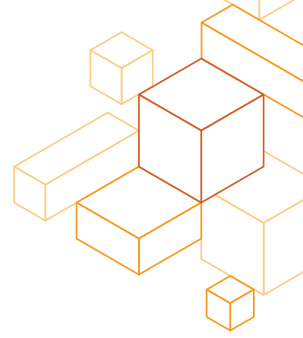
The illustration provides a conceptual breakdown of the supply chain impacts into direct, indirect, and induced effects.
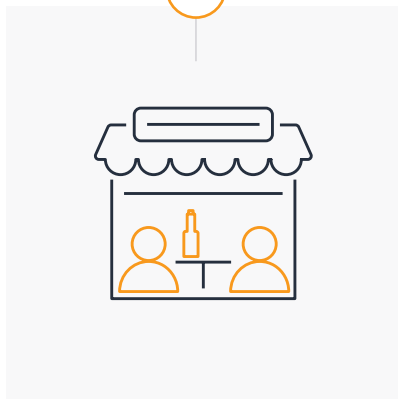
Direct Effects
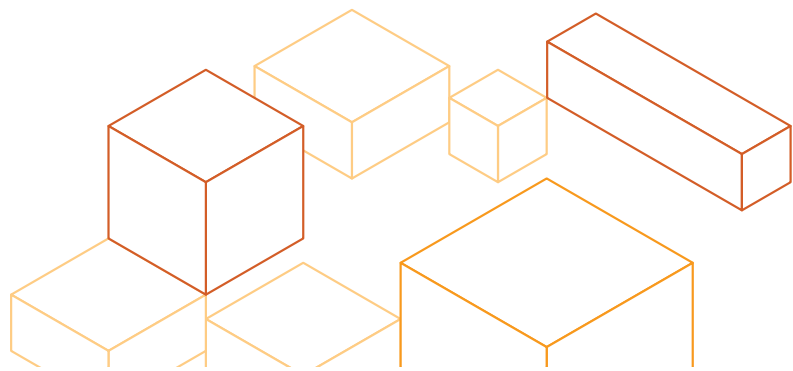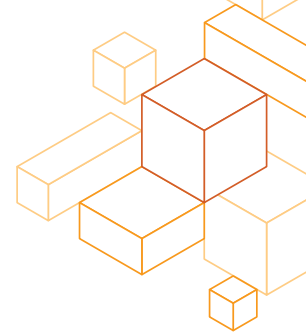Investments in construction and expenditures for operations

Indirect Effects
Inter-industry and supply chain spending

Induced Effects
Household income spending in local economy

Prioritizing **Data Security and Compliance**

Customer Security Is the Priority

AWS is committed to helping customers meet Swiss laws and regulations, and achieve the highest standards of security, privacy, and resiliency using AWS technology. AWS offers the most secure cloud environment available, meaning AWS customers have the freedom to build services quickly and efficiently using world-leading technology. The large network of AWS Partners in Switzerland specializes in delivering security-focused solutions, and can also help customers manage compliance and secure their workloads in every stage of cloud adoption from initial migration through day-to-day management.

Protecting What Is Important: Customer Data

AWS knows that protecting customer data is key to earning and maintaining customer trust. AWS works closely with customers as they navigate new regulations around security, data protection and privacy to understand their needs, and offers services, tooling, and resources to secure their data.

AWS is architected to be the most flexible and secure cloud computing environment available today. Its core infrastructure is built to satisfy data protection and security requirements for the military, global banks, and other high-sensitivity organizations. This is backed by a deep set of cloud security tools, with over 300 security, compliance, and governance services and features. With AWS, customers can trust that their data is secure.

AWS Enables Customers to Keep Their Content in Switzerland

AWS customers always retain ownership and control of their digital content, including where it is stored, how it is stored, and what access is granted to whom. Customers can also choose to encrypt their content at rest or in motion, using AWS tools or supported third-party security solutions, while maintaining full control of the encryption keys. Content that has been encrypted is rendered inaccessible without the applicable decryption key. With 28 active AWS Regions globally, AWS customers can safely store their content in any of the AWS Regions in Europe or around the world, including the AWS Europe (Zurich) Region. AWS will not move customer content from the AWS Regions selected by the customer, except to provide the services initiated by the customer, or as necessary to comply with the law, or a valid and binding order of a governmental body. If AWS customers choose to transfer data outside of Switzerland or the European Economic Area (EEA), then they can rely on the Standard Contractual Clauses adopted by the European Commission in June 2021. These clauses are part of the AWS Data Processing Addendum and customers can be comfortable that the data transferred will have the same high level of protection that data receives in Switzerland or the EEA.
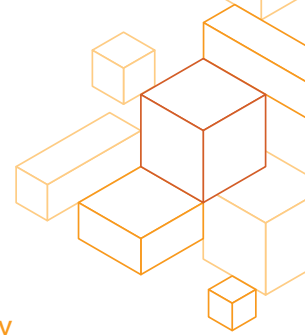
AWS launched multiple online resources and tools to help customers more easily complete data transfer assessments to comply with the General Data Protection Regulation (GDPR). These tools, developed in alignment with the European Data Protection Board (EDPB) recommendations, help customers transfer data between locations. For example, the Privacy Features for AWS Services resource helps customers determine whether their use of an individual AWS service involves the transfer of customer data outside of the AWS Region they chose. A small number of AWS services involve the transfer of data, for example, to develop and improve those services, where customers can opt-out of the transfer, or because transfer is an essential part of the service (such as content delivery services). AWS tools and services, such as AWS CloudHSM and AWS Key Management Service (AWS KMS), make it easier for AWS customers to incorporate AWS controls into their governance framework and applications. As an answer to confidential computing, the AWS Nitro System enables customers to secure their data during processing by using specialized hardware and associated firmware to protect customer code and data from outside access.

As AWS continues to enhance the capabilities of its on-demand services, customers can be confident that choosing AWS ensures that they have the necessary tools to meet the most stringent security, privacy, and compliance requirements.

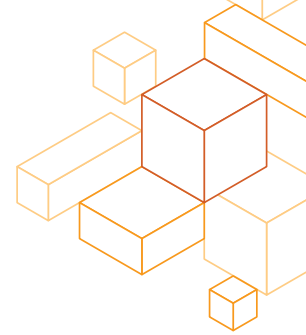## AWS Services and Resources Help Customers with GDPR Compliance

Achieving compliance with the GDPR is critical for AWS customers. AWS customers can use AWS technologies to process personal data that is uploaded to AWS in compliance with GDPR and the Swiss Federal Data Protection Act (FDPA).

New Features
In addition to AWS's own compliance, AWS is committed to offering services and resources to its customers to help them comply with the GDPR requirements that may apply to their activities. New features are launched regularly, and AWS has over 500 features and services focused on security and compliance.

Strengthened Commitments
Following the Schrems II ruling, AWS has implemented strengthened contractual commitments that go beyond what is required by the ruling. For example, the strengthened AWS contractual commitments include challenging law enforcement requests from governmental bodies when the request conflicts with EU law; or if, despite challenges, AWS is ever compelled by a valid and binding legal request to disclose customer data, AWS will disclose only the minimum amount of customer data necessary to satisfy the request.

AWS Achieves Internationally Recognized Certifications and Attestations

The AWS global infrastructure is designed and managed according to security best practices as well as a variety of security compliance standards. With AWS, customers can be assured that they are building web architectures on top of some of the most secure computing infrastructure in the world.

Customers benefit from the AWS Compliance Program, which helps them understand the robust controls in place at AWS to maintain security and compliance in the cloud. By tying together governance-focused, audit-friendly service features with applicable compliance or audit standards, AWS Compliance Enablers build on traditional programs, helping customers to establish and operate in an AWS security control environment.

To provide an added level of assurance to its customers that AWS can be used in compliance with the GDPR, AWS has collaborated with Ernst and Young CertifyPoint[4] to independently certify 52 services as complying with the Cloud Infrastructure Service Providers Europe Data Protection Code of Conduct (CISPE Code).[5]

Validated by the EDPB and approved by the French Data Protection Authority (CNIL), the CISPE Code assures organizations that their cloud infrastructure service provider meets the requirements applicable to personal data processed on their behalf (customer data) under the GDPR. The CISPE Code also raises the bar on data protection and privacy for cloud services in Europe, going beyond current GDPR requirements.

AWS Helps Customers Navigate an Evolving Security Environment

In 2021, AWS announced the publication of the AWS User Guide to Financial Services Regulations and Guidelines in Switzerland whitepaper and workbooks. This guide refers to certain rules applicable to financial institutions in Switzerland, including banks, insurance companies, stock exchanges, securities dealers, portfolio managers, trustees and other financial entities which are overseen (directly or indirectly) by the Swiss Financial Market Supervisory Authority (FINMA).

[4] Ernst and Young CertifyPoint was the first independent monitoring body accredited by the French Data Protection Authority (CNIL), the lead supervisory authority for the CISPE code.
[5] The CISPE Code of Conduct is the first pan-European data protection code of conduct for cloud infrastructure service providers.
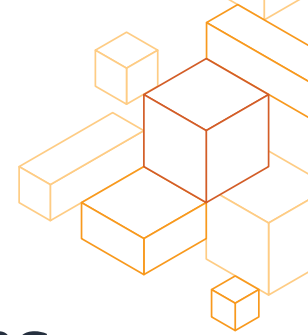
About Our Customers:
Benefits to Swiss Organizations Using AWS

In Switzerland, AWS works with more than 10,000 active customers, including organizations such as as Eidgenössische Technische Hochschule Zürich (ETH Zürich), Fisch Asset Management, Helvetia, Richemont, Swiss Broadcasting Corporation (RSI), Swiss Post, Swisscom, and Swisstopo. Private and public sector organizations in Switzerland use AWS to accelerate their time-to-market, reduce costs associated with IT operations, and scale their businesses globally. Enterprises can reduce costs and improve application performance by migrating their data from legacy infrastructure to AWS.

Helvetia Group, with its headquarters in St. Gallen, has grown since 1858 to become a successful insurance group with over 12,000 employees and more than seven million customers. The company is the leading all-lines insurer in Switzerland. In the Europe segment, comprised of Germany, Italy, Austria and Spain, the company has firmly rooted market positions for generating above-average growth. In the Specialty Markets segment, Helvetia offers tailored special insurance and reinsurance cover worldwide. In 2018, the company developed its cloud strategy with support from AWS with the aim to get better access to innovative technology platforms, standardize their IT landscape, and drive automation forward. By starting with simple applications and gaining experience that helped them further move to the cloud, today, more than half of Helvetia Switzerland's and the group's applications run in the cloud. Helvetia is on a path to migrate around 80 percent of applications to the cloud by 2023, which is when the company plans to exit its own data centers. Helvetia leverages AWS enterprise support and Direct Connect with its compute and storage services and cost savings potential by buying savings plans on a regular basis. Helvetia is running its entire front-end development on AWS, all self-developed, and is now exploring core systems migration.

Leading Swiss companies use AWS to power their IT infrastructure, increase operational efficiency, and fuel innovation. Switzerland's leading telecoms company and one of its leading IT companies, Swisscom, is using AWS's proven and broad infrastructure and cloud capabilities to power its 5G network, increase operational efficiency, and fuel innovation. Swisscom is pursuing a cloud-first strategy and will use AWS to increase IT agility, drive operational efficiencies, and accelerate time to market for new information and communications technology (ICT) features and services. Together with other partners, Swisscom will also leverage AWS infrastructure and services to explore how it can build a reliable, scalable, secure, and cost-effective 5G Core in the cloud that would enable rapid development and deployment of new 5G services for its customers.
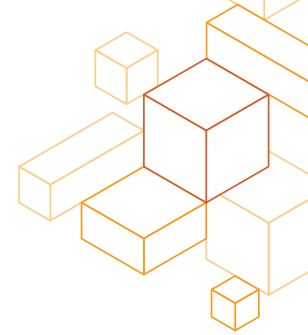
Swiss public sector organizations also entrust AWS to innovate and transform the delivery of services to citizens while enhancing reliability or security.

Swiss Post is a 170-year-old, highly trusted national institution and one of Switzerland's largest employers. Over 60,000 staff deliver seven million letters and up to more than one million parcels daily. Swiss Post supports international e-commerce operations accounting for approximately 80 percent of total Swiss e-commerce purchases. When Swiss Post identified changing customer demands, such as fulfilling international ecommerce, it was burdened by legacy IT. Scaling for growth and additional demands was difficult. And innovation, while central to its future, could not be at the expense of the reliability customers expect while security must be the rock upon which everything would be built. In 2018, Swiss Post launched an ambitious plan to modernize its applications and chose AWS at the core of its cloud-native strategy. Swiss Post used over 80 AWS capabilities to re-architect and migrate more than 30 IT applications and started building a new logistics and e-commerce ecosystem (NES), which moved from proof of concept to production-ready within three months. With NES, Swiss Post can easily adjust to changes in demand and continuously develop new features allowing for an agile development and operations process with a high degree of automation and security. Using AWS, Swiss Post also automated its application management, leading to significant operational cost savings.

AWS also enables organizations to rapidly launch and scale technology solutions. Swisstopo (Swiss Federal Office of Topography) embarked into the public cloud journey, which was migrating its business operations to a remote facility accessed through the internet and managed by a third-party provider. Swisstopo was an early AWS adopter, using AWS since 2010 to empower its digital geographic information system (GIS) and services for over 80,000 daily users all over Switzerland. By using automatic provisioning to scale horizontally on demand, Swisstopo achieved a decrease in the setup time for hardware from 10 weeks to under one hour.
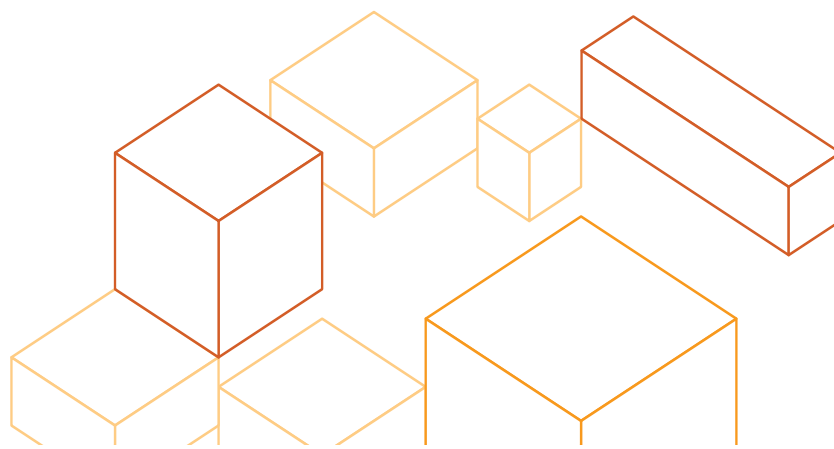
Training and Workforce Development Programs
in Switzerland

AWS technology makes innovation possible, but it is people who get the work done. AWS offers a variety of educational, training, and certification programs that help the Swiss workforce develop digital skills and adopt cloud technologies.

AWS Training and Certification (AWS T&C) equips individuals and teams with the skills to use AWS to innovate in the digital world. With training designed by AWS experts, learners at all levels can build with confidence, enabling leaders to drive transformation and deliver results in their organizations. Since establishing local training operations in Switzerland in 2019, AWS T&C has delivered training and certification programs to individual learners, customers, and AWS Partners to rapidly build cloud skills and close the skills gap. In addition to AWS-delivered training, AWS also works with local AWS training partners, like Digicomp Academy, to deliver cloud education and training.

Amazon is investing hundreds of millions of dollars to help 29 million people around the world grow their tech skills by 2025, with free cloud computing training through AWS-designed programs. Amazon's free training is designed to meet a wide variety of schedules and learning goals and each program offers something different.

AWS Skill Builder was launched in 2021 to help accelerate this goal. A digital learning experience available in more than 200 countries and territories, it provides free skills training to millions of people around the world. Anyone with an internet connection and a desire to learn can quickly and easily access over 500 free on-demand courses—including nearly 60 new cloud computing classes added in the past year. AWS also offers live, classroom-based training (delivered virtually or in-person) taught by AWS experts, using presentations, discussions, and hands-on labs.

AWS Skill Builder subscriptions give registered individuals and organizations access to exclusive learning materials built by builders for builders. In addition to over 500 free courses, there are four new learning experiences available. These experiences help customers develop practical skills to help solve real-world problems.

AWS Academy empowers higher education institutions to prepare students for careers in the cloud by providing a free, ready-to-teach cloud computing curriculum. The curriculum prepares students to pursue industry-recognized certifications and in-demand cloud jobs. AWS Academy helps educators stay at the forefront of AWS innovation so they can equip students with the skills they need to get hired in one of the fastest-growing industries. AWS Academy courses include AWS Academy Cloud Foundations, AWS Academy Cloud Architecting, AWS Academy Machine Learning, and AWS Academy Data Analytics.

Several universities in Switzerland have delivered AWS Academy courses as part of their curriculum, including Fachhochschule Nordwestschweiz (FHNW), Fachhochschule Luzern, and Technische Berufsschule Zürich. To date, 32 Swiss institutions participated in the AWS Academy program and 16 offered classes in 2022.

AWS Educate offers free, self-paced digital training to individual learners who are interested to learn about cloud computing. Through AWS Educate, students starting at the age of 13 years old can access hundreds of hours of training and resources curated specifically for new-to-cloud learners. Training content is organized into six groups, including Most Popular Courses and Labs, Cloud Skill Basics, Cloud Skill Advanced, Prepare for Workplaces, Learn on Twitch, and Young Learner. AWS Educate also offers free hands-on labs to learn, practice, and evaluate cloud skills in the AWS Management Console.

AWS re/Start is a free full-time classroom-based skills development and training program that prepares individuals for careers in the cloud and connects them to potential employers. The program aims to build local talent and is targeted to unemployed and underemployed individuals, with no technical experience required to apply. In March 2022, AWS launched AWS re/Start in Switzerland in collaboration with Powerhouse Lausanne, a training provider that promotes digital equality and diversity in Switzerland. To achieve this, Powerhouse offers IT programs and events to vulnerable audiences in order to provide them with access to education independent of their socio-economic background.

In October 2022, a second cohort of AWS re/Start began. This second AWS re/Start cohort includes many individuals from Ukraine, who arrived in Switzerland as a result of the ongoing military conflict between Russia and Ukraine. This works in collaboration with the nonprofit Powercoders, which is focused on teaching IT skills to refugees and helping them transition into the Swiss labor market.

AWS has partnered with the ICT Berufsbildung Schweiz association for several years to deliver vocational education and training to Swiss workers. In 2020, AWS supported the association to rework the national IT curriculum by helping develop new cloud modules that have been taught to every Swiss IT apprentice (3,000 per year) since 2021. AWS also supports the Swiss Skills, an initiative to promote excellence and development of vocational championships in Switzerland enabling young professionals to participate in international vocational championships including WorldSkills and EuroSkills. The initiative started in 1953 when Switzerland participated for the first time in the European championship of craftspeople. In 2022, a cloud computing competition was added to the program. AWS supported the contestants with custom training delivered over a period of three weeks in preparation for the final competition in September 2022.

AWS also offers the AWStudents Mentoring Program for students in Switzerland. The goal of the program is to help students build a career in the tech industry. Swiss students are assigned a mentor from AWS for one year, who shows them different career options in the tech industry and coaches them. AWS also provides participants with a variety of trainings and community events to deepen their skills and knowledge needed to advance in the industry. The first cohort started in November 2021 and ended in July 2022 and included students from the Zurich University of Applied Sciences and University of St. Gallen and was supported by AWS customer Swiss Re and 1plusX, a TripleLift Company.

AWS **Community Development** in Switzerland

Talent diversity helps ensure that Switzerland remains at the forefront as a leading digital innovation location. Amazon is a company of builders who bring varying backgrounds, ideas, and points of view to inventing on behalf of its customers. Diversity and different skills in teams offer enormous potential—they are often more innovative, productive, and successful. The company is committed to increasing diversity and promoting inclusion in tech professions.

herHACK is the largest female hackathon in Switzerland. AWS, together with digitalswitzerland and Cognizant, launched herHACK in 2021 as part of the Swiss Digital Days to increase diversity and promote women in technical professions. More than 200 women of any experience, background, and knowledge signed up to learn new skills, and grow their network while experiencing an inspiring environment. Since 2022 when the first edition took place in Zurich, herHACK was rolled out to seven regions across Switzerland and has won new co-partners including amag, PMI Science, UBS, and Mobiliar.

AWS GetIT is a fully funded education program and competition designed to inspire 12-to-14-year-old students, especially girls, to consider a future in science, technology, engineering, and mathematics (STEM). The program helps schools and educators bring tech role models to their classrooms and gives them access to curriculum designed to help students build foundational skills, learn about cloud technology, and design app ideas to solve problems in their communities. The program was launched in Switzerland in the 2021-2022 academic year.

AWS and Sustainability
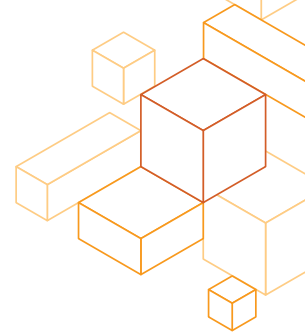
The Climate Pledge to Achieve Net-Zero Emissions

Amazon is committed to becoming a more sustainable business and reaching net-zero carbon across its operations by 2040, 10 years ahead of the Paris Agreement, as part of The Climate Pledge. Amazon cofounded The Climate Pledge and became its first signatory in 2019. As part of its Climate Pledge commitment, Amazon is on a path to power its operations with 100 percent renewable energy by 2025, five years ahead of the original 2030 target. Amazon is the world's largest corporate purchaser of renewable energy, and as of the end of 2021, reached 85 percent renewable energy across its business. Organizations that move compute workloads to AWS can benefit from the net effect of Amazon's sustainability efforts to reduce their carbon footprint.
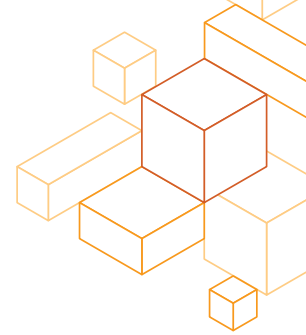
Amazon has announced 379 renewable energy projects globally, representing 18.5 gigawatts (GW) of clean energy capacity. Once fully operational, the projects are expected to deliver 50,000 gigawatt-hours (GWh) of energy annually—the equivalent amount of electricity needed to power 4.6 million US homes each year. This includes Amazon's most recently announced renewable energy projects in September 2022, which added 2.7 gigawatts (GW) of clean energy capacity across 71 new renewable energy projects. This includes the company's first renewable energy project in South America—a solar farm in Brazil—and its first solar farms in India and Poland.

Leading Data Center Sustainability in Europe

In 2021, AWS joined the data center industry in Europe to create the Climate Neutral Data Centre Pact, an industry commitment to proactively lead the transition to a climate neutral economy. The Pact establishes a Self-Regulatory Initiative developed in cooperation with the European Commission. It supports both the European Green Deal, which aims to make Europe the world's first climate neutral continent by 2050, and the European Data Strategy to make EU data centers climate neutral by 2030.

Signatories of the Pact commit to meeting ambitious goals that facilitate Europe's essential transition to a green economy by agreeing to meet measurable targets for energy efficiency; purchase 100 percent renewable energy; prioritize water conservation; reuse and repair servers; and look for ways to recycle heat.
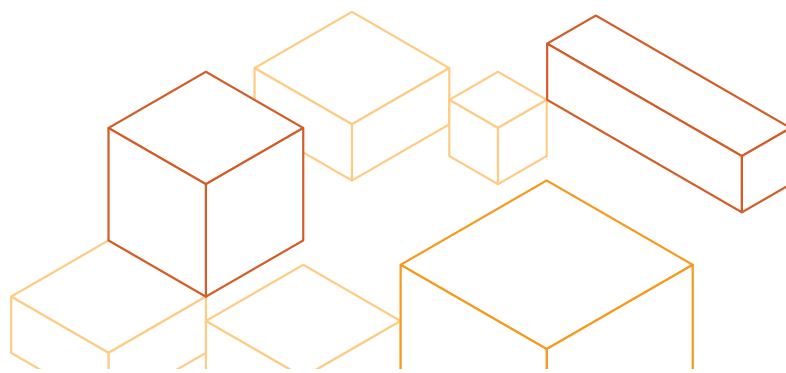
Achieving Emissions Reductions with AWS

AWS is committed to minimizing the environmental impact of its business. AWS seeks to grow the use of renewable energy in the grids powering AWS data centers and to achieve 100 percent renewable energy usage for its global infrastructure by 2025. In addition to helping customers increase agility and reduce costs, moving to AWS is also much more sustainable as customers no longer must provision for peaks, and AWS's infrastructure is designed to operate efficiently at scale. Organizations will need to make energy-efficient computing an even higher priority as they seek to minimize their environmental impact and computing demand grows.
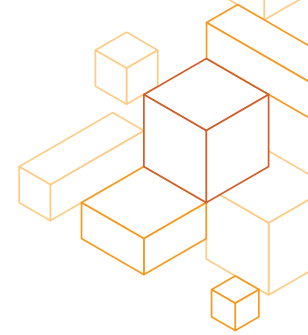
AWS global infrastructure is built on AWS's custom hardware, which is optimized for one set of requirements—multiple cloud workloads run by AWS customers. This results in efficiency advantages at both the server and facility levels in AWS infrastructure, and translates into dramatically less energy used to perform the same unit of work. According to a study conducted by 451 Research, AWS infrastructure is up to five times more energy efficient than the average European enterprise data center. Further, migrating Swiss enterprise workloads to AWS would result in energy savings of up to 80 percent and would reduce annual carbon emissions by up to 1,079 metric tons of CO_2 per megawatt.[6] This advantage is attributable to the combination of more energy-efficient servers, higher server usage, and excellence in sustainable design achieved by AWS infrastructure.

AWS designs server systems with great attention to power optimization, using the latest technology components. AWS runs servers at higher usage levels than enterprise data centers, leveraging the ability to share and dynamically allocate resources in the cloud.

The AWS Graviton3 processor is an example of how AWS builds hardware with sustainability in mind. Graviton3-based Amazon Elastic Compute Cloud (Amazon EC2) instances use up to 60 percent less energy for the same performance than comparable Amazon EC2 instances. In addition to energy reduction, Graviton3 offers 25 percent faster speeds, providing boosted performance for science, cryptographic, and ML workloads. With the world's increasing need for compute and other IP infrastructures, continually innovating at the chip level is critical to ensuring that AWS can sustainably power the workloads of the future.

Facility-level improvements in efficiency include data center designs that use lower energy methods and a leaner electrical infrastructure, resulting in lower energy losses to power distribution. As Swiss customers move their workloads from enterprise data centers to AWS, the carbon footprint of these workloads is reduced due to much lower energy consumption.

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[6] https://www.aboutamazon.eu/news/aws/eu-businesses-that-move-to-aws-cloud-can-improve-energy-efficiency-and-reduce-carbon-emissions

## Helping Customers Become Sustainable Cloud Users

Once customers migrate to AWS, the company helps customers improve their sustainability in the cloud through tools such as the Sustainability Pillar for Well-Architected Framework and the customer carbon footprint tool. These tools help AWS customers understand the environmental impacts of the services they use, quantify impacts through their entire workload lifecycle, and apply best practices to reduce these impacts.

The Sustainability Pillar in the AWS Well-Architected Framework helps customers improve their cloud architecture, which consists of design principles, questions, and best practices across six pillars—Operational Excellence, Security, Reliability, Performance Efficiency, Cost Optimization, and Sustainability. The Sustainability Pillar helps AWS customers structure their cloud architecture to reduce energy consumption and improve efficiency. The framework helps customers reduce their carbon footprint by integrating sustainability goals, impact measurements, workload maximization, service management, and actions to reduce downstream energy usage.

AWS also offers the customer carbon footprint tool to help customers calculate the environmental impact of their AWS workloads. The new tool uses easy-to-understand data visualizations to provide customers with their historical carbon emissions, evaluate emission trends as their AWS use evolves, estimate the tonnage of carbon emissions avoided by using AWS instead of an on-premises data center, and review forecasted emissions based on current use. The forecasted emissions are based on current usage and show how a customer's carbon footprint will change as Amazon stays on path to powering its operations with 100 percent renewable energy by 2025 and drives toward net-zero carbon by 2040 as part of The Climate Pledge.

Accelerating Innovation in Climate Analysis

The **Amazon Sustainability Data Initiative (ASDI)** seeks to accelerate sustainability research and innovation by helping customers minimize the cost and time required to acquire and analyze large sustainability datasets. ASDI supports innovators and researchers with the data, tools, and technical expertise they need to move sustainability to the next level. ASDI currently works with scientific organizations like the National Oceanic and Atmospheric Administration (NOAA), and National Aeronautics and Space Administration (NASA) to identify, host, and deploy key datasets on AWS, including weather observations, weather forecasts, climate projection data, satellite imagery, hydrological data, air quality data, and ocean forecast data. These datasets are publicly available to anyone.
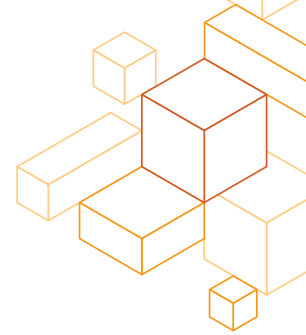
EIS **Methodology**

To compute the economic impact of AWS data center investments, AWS uses a value-added approach and the input-output analysis. Input-output models measure the value added by the expansion or contraction of one economic activity on other economic activities and the local economy as a whole. This allows AWS to compute the gross domestic product contributed and jobs supported by investment made by AWS and throughout its supply chain. The input-output methodology is credited to Harvard economist Wassily Leontief, who was awarded a Nobel Prize in economics in 1973 for the development of this method and its applications.

Using the value-added approach, AWS calculates the jobs supported and gross domestic product contributed locally by AWS and throughout its supply chain. In AWS methodology, "local" typically describes a country but could also be a smaller division, such as a county, metropolitan statistical area (MSA), state, or region (for example, Lombardy in Italy). This method uses historical country data maintained by the country's government statistical agency, or the OECD.

Input-output tables show the impact of each unit of currency spent in one industry on all other industries. For example, one US dollar, or approximately one Swiss franc, spent on construction might typically be associated with 20 cents, or 0.2 Swiss francs, spent on electricity and other utilities. AWS also uses internal Amazon company financial projections on AWS operations and investment associated with constructing and operating data centers. AWS uses standard procedures for computing multipliers from input-output data. See, for example, Ronald Miller and Peter Blair, "Input-Output Analysis: Foundations and Extensions," 2009, Cambridge University Press.