AWS Economic Impact Study

AWS Investment in France

AWS Economic Development | 2022

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Executive Summary

6 billion euros

Total Capital and Operational Investment Associated with the AWS Europe (Paris) Region During 2017–2031

16.8 billion euros

Gross Domestic Product (GDP) Contributed to France by the AWS Europe (Paris) Region During 2017–2031

5,271 jobs

Average Annual Full-Time Jobs Supported by AWS Investment in France at External Contractors During 2017–2031

In 2017, Amazon Web Services (AWS) launched the AWS Europe (Paris) Region, along with a 15-year plan to expand related infrastructure and operations. By delivering a local and secure option to store data and the possibility to deploy workloads, the local infrastructure enables our customers supporting regulated industries to comply with French laws and regulations. Further, AWS compliance with the most rigorous international security standards, including the Hébergement de données de Santé (HDS) in France, enables our customers to scale data protection and compliance with their business.

The AWS Europe (Paris) Region provides AWS customers with the ability to store their data locally and solve critical low latency challenges. AWS customers storing their data in the AWS Europe (Paris) Region or in any of our Regions 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.

In addition to bringing cutting-edge cloud technology to our customers in France, the construction and operation of AWS infrastructure in the country provides numerous economic benefits to the French economy. AWS also invests in renewable energy projects, and cloud workforce and education programs to grow a sustainable and responsible cloud ecosystem in France. This study quantifies the following key benefits:

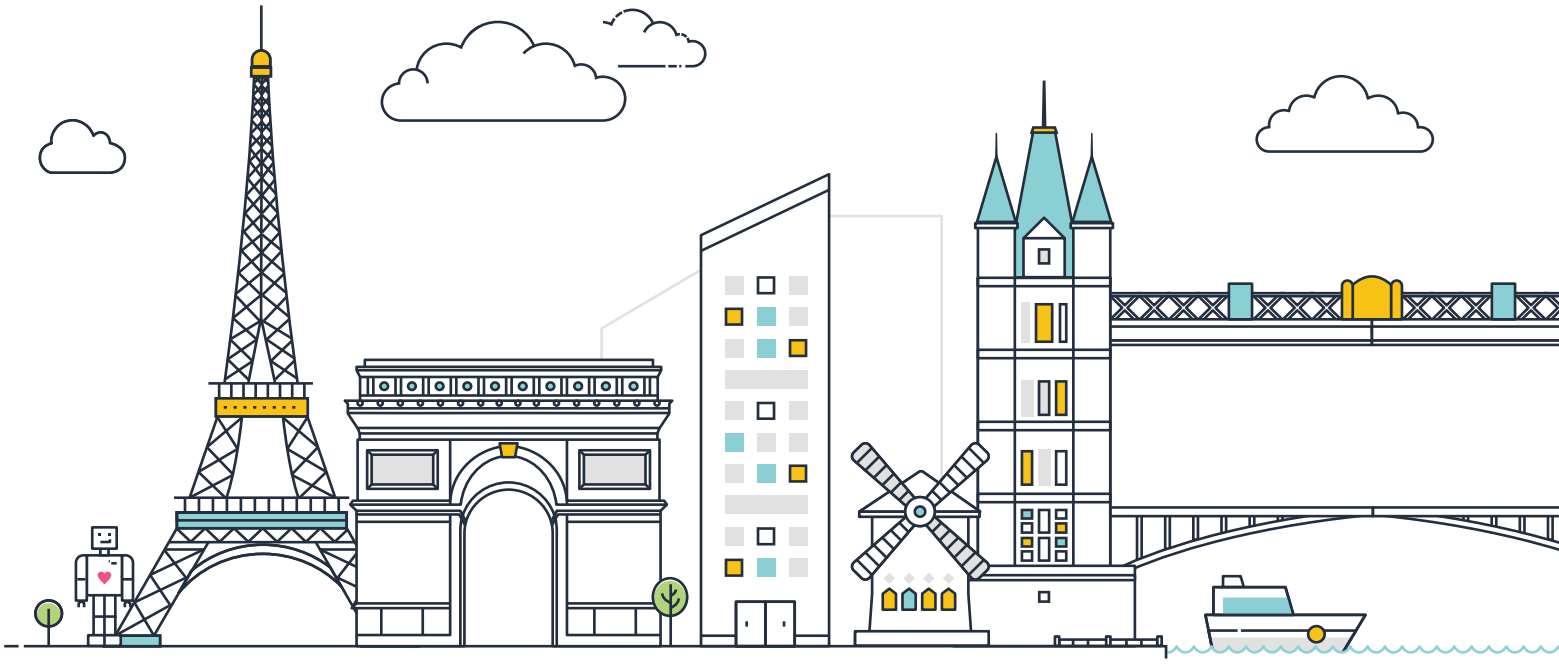
- AWS contributes to the GDP of France by enabling tens of thousands of French AWS customers to increase revenue and reduce costs. A 2021 study by Public First estimated that **AWS enabled French businesses to contribute 1.6 billion euros in GDP in 2020, supporting 22,000 full-time jobs.**

- **During 2017–2021, AWS invested nearly 700 million euros in establishing, maintaining, and operating the AWS Europe (Paris) Region. AWS plans on investing an additional 5.3 billion euros in related capital and operational expenditures in our Region in France during 2022–2031.** 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 operations.

- We estimate total investment associated with our Region will contribute **16.8 billion euros to the GDP of France during 2017–2031** using Amazon company financial projections, the input-output methodology, and statistical tables provided by Institut national de la statistique et des etudes economiques (Insee). The GDP contribution includes value added by the sale of AWS to France's information technology (IT) sector and in-country spending on goods and services related to the construction and operation of AWS data centers.

- Using the same input-output methodology and data, we estimate that AWS investment during 2017–2031 will support an annual average of **5,271 full-time jobs at external contractors** in the French data center supply chain. AWS investment supports employment in sectors across the data center supply chain, such as telecommunications, nonresidential construction, electricity generation, facilities maintenance, and data center operations.

- AWS runs our business in the most environmentally friendly way possible by investing in renewable energy and energy-efficient infrastructure. **AWS infrastructure is up to five times more energy efficient than the average EU enterprise data center, and migrating 1 megawatt (MW) of typical workloads from a French organization's data center to AWS Cloud reduces carbon emissions by as much as 233 metric tons of CO2 a year.** We also have announced two renewable energy projects that are expected to produce over 64 GWh of clean energy when fully operational – enough to enable the abatement of over 3,600 tons of CO2 a year.



[1] https://www.insee.fr/en/accueil

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 products and 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 our 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%. 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."[1]

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 our operations with 100% renewable energy by 2025—five years ahead of our original target of 2030. AWS contributes toward these goals by constantly improving the energy efficiency of our computing resources and by increasing the share of renewable energy in total consumption by our 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.

[1] 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 **France**

Tens of thousands of French enterprises and startups use AWS technology to innovate, accelerate their business, and develop new activities. Over 80% of firms listed on the CAC 40, the French stock market index, as well as more than 70% of the 25 French unicorns, startups with a value over one billion euros, run on AWS. Additionally, numerous French public sector organizations use AWS to power their digital transformation, scale their impact, and help French citizens adapt and persevere through major global events.

The AWS Partner Network (APN) helps AWS customers build, migrate, and accelerate their business in the cloud. The APN indirectly supports employment at over 200 AWS Partners actively offering services in France, of which over 120 are headquartered 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, and benefits. Upon joining the APN, AWS Partners can enroll in the Partner Path best aligned 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 solutions.

AWS Partners help enterprise and public sector customers migrate to AWS, deploy applications, and provide a full range of support for customers' AWS environments. **Capgemini**, an AWS Premier Consulting Partner with over 6,200 active AWS Certifications in more than 40 countries, helps companies define cloud system requirements, create network architecture and implementation plans, and build cloud solutions on AWS. Capgemini has delivered more than 7,500 successful cloud projects and has more than 25 active customer references with AWS from industry leaders such as Storengy, a subsidiary of the French multinational utility the Engie Group. AWS Partners supporting French customers include Accenture, Dataiku, Devoteam Revolve, Infor, Ippon, Micropole, MongoDB, Orange Business Services, Sage, SAP, Skale-5 (Neoxia), Smile, Snowflake, Splunk, TeamWork, and VMware.

With over 300 AWS-certified staff, **Orange Business Services** is a network-based digital services company that supports businesses in areas such as software-defined networks, multi-cloud services, data and artificial intelligence (AI), smart mobility services, and cybersecurity. Orange Business Services is an AWS Advanced Partner, AWS Managed Service Provider, and AWS Direct Connect Service Delivery Partner. Partners such as Orange Business Services, Capgemini, and many others use AWS technologies to deliver IT solutions to customers in France and around the world.

In addition to our local customers and Partners, approximately 1,000 Amazon employees in France support AWS operations in regular full- and part-time roles, and operate from offices in Paris (La Defense), Lyon, Lille, Nantes, Bordeaux, and Toulouse. These employees include the operations technicians and engineers that support AWS infrastructure and the solutions architects, sales representatives, software developers, professional services consultants, and business development professionals that develop AWS technologies, and support AWS use and adoption by our customers and partners. Amazon has hired hundreds of new employees in France to support local AWS customers since our Region launch in 2017. We expect to continue hiring hundreds of new employees as the AWS Europe (Paris) Region expands infrastructure and operations to support the projected growth in demand for AWS technologies.

The benefits provided by AWS contribute GDP to the French economy by enabling tens of thousands of customers to increase revenue and reduce costs. A 2021 AWS-commissioned study by Public First estimated that **AWS enabled French businesses to contribute 1.6 billion euros in GDP in 2020, supporting 22,000 full-time jobs.**

AWS Locations in France

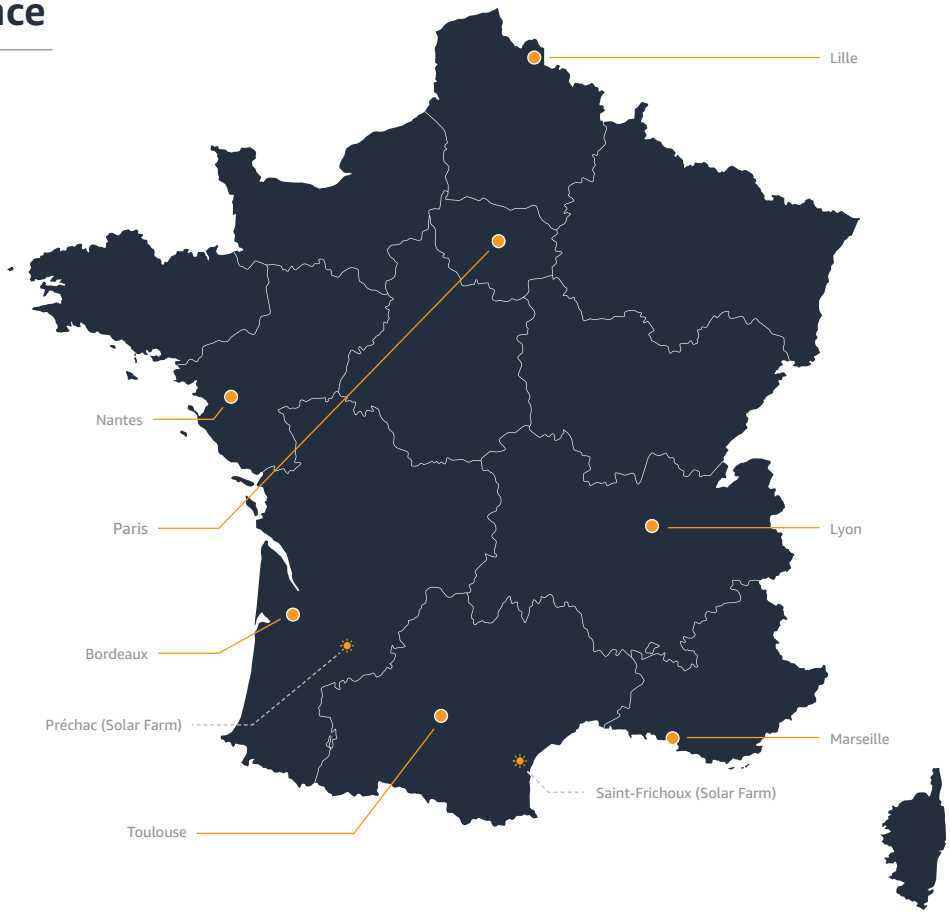
Amazon Offices:
Paris, Lyon, Lille, Nantes, Bordeaux, Toulouse

AWS Region:
Europe (Paris)

AWS Direct Connect Locations:
Paris, Marseille

AWS Edge Network Locations:
Paris, Marseille

Amazon Solar Farms:
Préchac, Saint-Frichoux

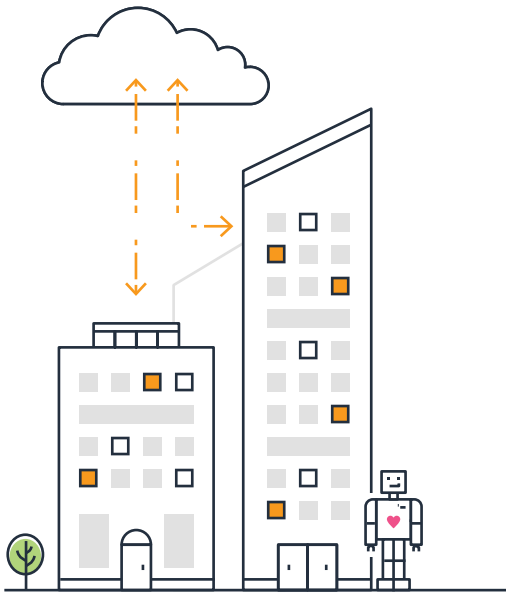


AWS Infrastructure **in France**

The launch of the AWS Europe (Paris) Region adds to our history of continued investment in infrastructure and corporate operations in France. In 2011, AWS launched our first infrastructure in France, opening an Amazon CloudFront edge location in the Paris region. Today, we operate nine edge network locations in Paris and four in Marseille, which enable customers to access our CloudFront and Amazon Route 53 services.[7] CloudFront accelerates the delivery of data, videos, applications, and APIs to users worldwide through our edge locations, and Route 53 enables customers to reliably route end users to internet applications.

Growing demand for AWS Cloud services in France led to the launch of the AWS Europe (Paris) Region in December 2017 with three Availability Zones (AZ). 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.

Unlike other cloud providers, which often define a Region as a single data center, 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 redundant, high bandwidth, low latency networks. AWS customers focused on high availability can design their applications to run across multiple AZs to achieve even greater reliability. AWS Regions meet the highest levels of security, compliance, data protection, and data privacy in their design and operations.



The AWS Europe (Paris) Region enables local customers to store their data in France with the assurance that they retain complete control over the location of their data and can comply with data residency, data privacy, and other existing and future regulatory requirements. In addition, our Region in France enables local customers to run applications with lower latency and use advanced technologies such as analytics, AI/ML, databases, Internet of Things (IoT), mobile services, serverless, and more to drive innovation in France.[2]

[2] A complete list of AWS services available in our Europe (Paris) Region is included here: https://aws.amazon.com/about-aws/global-infrastructure/regional-product-services/

AWS also operates four AWS Direct Connect locations in Paris and one in Marseille, which enable customers to establish private connectivity between AWS and their data center, office, or colocation environment. This can reduce network costs, increase bandwidth throughput, and provide a more consistent network experience. AWS operations technicians and engineers ensure continued operation of AWS infrastructure.

The AWS Region in France, edge network, and Direct Connect locations all support increasing demand for AWS services in France by the French IT sector, and the growing number of startups, enterprises, and public sector organizations seeking to accelerate their digital transformation and better support their community.

Our global footprint also enables AWS customers in France to operate in any of our Regions around the world, and many customers locate their data in multiple AWS Regions. Customers' data will not be moved between AWS Regions without their consent.

Economic Impact of AWS **Investment in France**

During 2017–2021, **AWS invested nearly 700 million euros in establishing, maintaining, and operating the AWS Europe (Paris) Region. AWS plans on investing an additional 5.3 billion euros in related capital and operational expenditures in our Region in France during 2022–2031.** This investment includes all cash expenses directly attributable to our 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 euros in recurring operating expenditures (OPEX), such as compensation for employees and contractors, utility fees, and facilities and rental costs. AWS plans on progressively constructing new data centers, tailoring existing data center shells, and expanding corporate operations as we expand our capacity to meet projected demand for AWS.

This study estimates that the planned investment associated with the AWS Europe (Paris) Region will **contribute 16.8 billion euros to the GDP of France** during 2017–2031 using Amazon company financial projections, the established input-output methodology,[3] and statistical tables provided by Insee. GDP contributed by our Region in France includes the value added by AWS to the IT sector in France, as well as the direct, indirect, and induced effects of AWS purchases from the French data center supply chain. The in-country portion of AWS investment will **support an annual average of 5,271 full-time jobs at external contractors** in France during 2017–2031.

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

[3] See Appendix A for details of the methodology

AWS Prioritizes **Data Security and Compliance**

Customer Security Is Our Priority

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

The AWS Region Enables Customers to Keep Their Content in France

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. AWS customers can store their content in any of our Regions in the European Union or across the globe, including the AWS Europe (Paris) Region, and retain the exclusive right to move content between AWS Regions. AWS customers can additionally rely on standard contractual clauses if they choose to transfer their content outside the EU, in full compliance with the EU's General Data Protection Regulation (GDPR).

AWS Achieves Internationally Recognized Certifications and Attestations

Achieving compliance with the EU's data protection regulations is critical for hundreds of thousands of AWS customers. Many of our customers are subject to the EU's GDPR, which ensures individuals' fundamental right to privacy and the protection of personal data. In response, we announced strengthened commitments to protect customer data, such as challenging law enforcement requests for customer data that conflict with EU law. As part of this announcement, AWS declared 52 services under the Cloud Infrastructure Service Providers Europe Data Protection Code of Conduct (CISPE Code).[4] This provides an independent verification and an added level of assurance to our customers that our cloud services can be used in compliance with GDPR.

[4] The CISPE Code is the first pan-European data protection code of conduct for cloud infrastructure service providers.

We comply with the most rigorous internationally recognized standards in data protection, including being the first cloud provider to receive the Cloud Computing Compliance Controls Catalog (C5) certificate in Germany. More recently, we received the HDS certification in France and the Esquema Nacional de Seguridad (ENS) in Spain to ensure customers with regulated data across the world can take full advantage of AWS technologies.

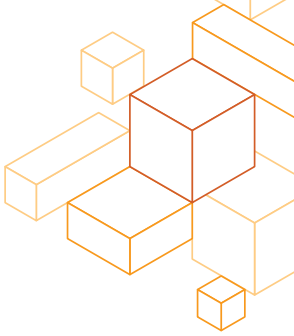
AWS Helps European Customers Navigate an Evolving Security Environment

Earning and keeping the trust of our customers is the foundation of our business at AWS, and we know protecting customer data is key to achieving this. AWS works closely with customers as they navigate new regulations around data security and privacy to understand their needs, and offers services, tools, and resources to secure their data.

AWS launched multiple online resources to help our customers more easily complete data transfer assessments and comply with the GDPR. These tools, developed in alignment with European Data Protection Board (EDPB) recommendations, help customers more intentionally transfer data between locations and disclose any transfer to end users. For example, the Privacy Features for AWS tool helps customers determine whether their use of an individual AWS service involves the transfer of customer data (data uploaded to the customer's AWS account). These tools make it easier for AWS customers to incorporate AWS controls into their governance framework and applications.

We also offer a wide variety of tools to enhance the security of cross-border data transfers for customers with global services. For example, AWS CloudHSM and AWS Key Management Service (AWS KMS) allow customers to encrypt data in transit and at rest, and securely generate and manage control of encryption keys. As one 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 tools necessary to meet the most stringent security, privacy, and compliance requirements.



About Our Customers: **Benefits to French Organizations Using AWS**

In France, AWS works with tens of thousands of customers, including organizations such as Canal+, Engie, Nexity, Soitec, and Veolia. Private and public sector organizations in France use AWS to accelerate their time-to-market, reduce costs associated with IT operations, and scale their businesses globally.

PMU, the European leader in pool horse-race betting and third-largest operator in the world, migrated 100% of its online betting activities to AWS to gain flexibility and agility in its IT operations. With 50% of bets made five minutes before the start of any race, PMU's computing power requires a high degree of elasticity to manage peaks in demand related to various sporting events. Using AWS, PMU can process 1 billion transactions per year, 4,500 bets per minute, and up to 2,000 transactions per second.

Stellantis, one of the world's leading automakers and mobility solutions providers, and owner of 14 iconic brands among which include the Peugeot, Citroen, and DS brands, uses AWS to provide customers with a connected in-car experience. With the number of digitally connected vehicles expected to grow to 34 million by 2030, up from 12 million today, Stellantis partnered with AWS to develop a cloud-based solution to analyze vehicle data and continuously improve the driver experience. Together, the companies are developing a cloud-based development environment that enables Stellantis to deploy new IT solutions across its fleet with accelerated time-to-release.

Global events, like the COVID-19 pandemic, shine a light on how the flexibility, scale, and reliability provided by the cloud enable organizations to quickly adapt. **TheFork** (part of TripadvisorMedia Group), the leading restaurant-booking platform in Europe, migrated to the AWS Europe (Paris) Region to manage peaks in activity, such as reservations for Valentine's Day. With the pandemic-related closure of restaurants, TheFork collaborated with AWS Partner Cloudreach to migrate 80% of its system to the cloud in just 4 months. Following the reopening of businesses, TheFork instantly absorbed the two-fold increase in traffic, while reducing response times by 30% and IT operations costs by 50%.

Both French enterprises and startups select AWS for its ability to scale securely and automate security tasks according to the highest standards. **ManoMano**, a French unicorn and European ecommerce leader in do-it-yourself (DIY), home improvement, and gardening products, used AWS to scale IT infrastructure as it doubled the turnover of inventory in a single year. AWS enables ManoMano cybersecurity teams to automate security processes, allowing them to focus on developing new features to secure the company's millions of customers and 3,600 partners.

Some of the most successful startups in France use AWS to build and instantly expand their businesses across the country, throughout Europe, and around the world. The scale and flexibility provided by AWS enable **Qonto**, a French unicorn, to deploy new payment, expense management, and bookkeeping services across its freelance and small business payment platform in seconds. Qonto leverages services like AWS Lambda and Amazon API Gateway to quickly create business functionalities in a domain regulated by Payment Card Industry Data Security Standard (PCI DSS).

French public sector organizations also entrust AWS to deliver the highest levels of security and privacy for mission-critical workloads, while transforming the delivery of services to citizens. For example, the **city of Drancy** uses AWS to simplify its citizens' daily lives and offer digital services such as counting votes during elections, improving waste collection, managing parking slots, and regulating heating in schools.

AWS also enables companies to rapidly launch and scale technology solutions addressing sustainability. **GreenCityZen** uses AWS to manage their network of environmental sensors tracking the performance of industrial facilities and smart-city infrastructure. For example, GreenCityZen sensors help cities manage their water network, including monitoring water quality, detecting waste accumulation, and implementing predictive maintenance. Using AWS, GreenCityZen doubled its number of environmental sensors, while simultaneously reducing their infrastructure costs by over 250%.

We expect to continue to grow our presence and support the development of a robust cloud computing ecosystem in France.

AWS Training and **Talent Development** Programs in France

AWS's commitment to France extends beyond infrastructure, and since 2017, we have supported France's digital transformation by training over 100,000 individuals in the country in cloud skills. AWS offers a variety of educational, training, and certification programs to help the French workforce develop digital skills and adopt cloud technologies.

AWS collaborates with educational institutions and nonprofits in France to help prepare tomorrow's talent, while creating opportunities for traditionally disadvantaged populations. AWS re/Start, a 12-week, full-time, cloud-skills development program that supports thousands of learners globally, collaborates with nonprofits in France to provide local workers with a pathway to earning AWS Certifications and launching cloud careers. AWS re/Start connects over 90% of graduates with interview opportunities by providing graduates with direct connections to employers for entry-level cloud roles.

In France, AWS re/Start grows its social impact by collaborating with nonprofits such as Konexio, which specializes in outreach to marginalized communities; La Plateforme, which engages youth from high-priority neighborhoods; and APF France Handicap, which supports persons with disabilities. Investment in the AWS re/Start program is just one of AWS's efforts to implement programs that increase the diversity of the cloud workforce and positively impact workforce development through the lens of diversity, equity, and inclusion. AWS re/Start programs are currently offered in Paris, Lille, and Marseille.

AWS Training and Certification programs equip individuals with the skills to use AWS Cloud to innovate in the digital world. With training designed by AWS experts, we empower learners at all levels to build with confidence, and leaders to drive transformation and deliver results in their organizations. AWS offers a free on-demand library of digital training courses built by experts at AWS. We currently offer 150+ free digital courses in French, with more coming soon. French learners can browse our library and choose from fundamental, intermediate, and advanced training to build cloud knowledge. Our most popular digital training course, AWS Cloud Practitioner Essentials, provides learners new to the cloud with a six-hour overview of AWS concepts, including AWS technologies, security, architecture, pricing, and support.

AWS collaborates with higher education institutions to help French students build in-demand cloud skills prior to entering the workforce. AWS Academy provides higher education institutions in France with a free, ready-to-teach cloud computing curriculum on topics including cloud foundations, cloud architecture, machine learning, and data analytics. Currently, students at 20+ institutions in France can take advantage of AWS Academy courses.

We also develop partnerships with leading academic institutions to identify applications for cloud technologies. The Cloud Innovation Center at SciencesPo provides an opportunity for nonprofits, education providers, and government agencies to collaboratively address their most pressing challenges, test new ideas using Amazon innovation processes, and access AWS technology expertise to develop innovative solutions for the public good. Since 2019, Sciences Po's "Incubateur de Politiques Publiques" has held four innovation cycles, directly trained over 410 students on public policy design, worked on over 62 challenges from 56 different public sector organizations, and delivered 84 unique solutions that led to the development of 17 technical prototypes and creation of one GovTech startup, Public+.

AWS and Sustainability

Our Climate Pledge to Achieve Net-Zero Emissions

Amazon is committed to reaching net-zero carbon emissions across our business by 2040 as part of The Climate Pledge, which we co-founded and became the first signatory in 2019, 10 years ahead of the Paris Agreement. We see ourselves as strong partners in working with the government and French businesses to help achieve emissions reduction targets. A key component of our commitment to net-zero carbon emissions is powering Amazon's infrastructure with 100% renewable energy, and the company is now on track to achieve this milestone by 2025, five years ahead of our initial 2030 target.

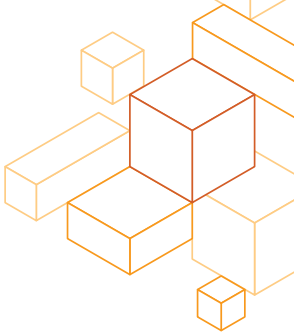
As of the end of 2021, Amazon reached 85% renewable energy across our business and is Europe's, and the world's, largest corporate purchaser of renewable energy. Amazon has 310 renewable energy projects across the globe, with over 15.7 gigawatts (GW) of clean energy capacity, and once fully operational, the projects are expected to deliver more than 42,000 gigawatt-hours (GWh) of energy annually—enough to prevent the emission of over 17.3 million tons of CO2 a year.

To meet this target in France, we have announced a 15 MW utility-scale solar project in Prechac (Gironde) and a 23 MW utility-scale solar project in Saint-Frichoux (Aude). These renewable energy projects are expected to produce over 64 GWh of clean energy when fully operational – enough to enable the abatement of over 3,600 tons of CO2 a year.

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% renewable energy; prioritize water conservation; reuse and repair servers; and look for ways to recycle heat.



Achieving Emissions Reductions With AWS Cloud

AWS is committed to sustainability and running our business in the most efficient way. We seek to grow the use of renewable energy in the grids powering AWS data centers and are on path to reaching 100% renewable energy across our global infrastructure by 2025. In addition to helping our customers increase agility and reduce costs, moving to AWS is also much more sustainable as customers no longer have to provision for peaks, and AWS's infrastructure is designed to operate efficiently at scale. Arcep research found computer terminals account for 80% of the carbon emitted by digital technology devices in France – with overall sector power consumption growing by 6% annually during 2016-2020.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—workloads run by AWS customers. This results in efficiency advantages at both the server and facility levels in our cloud 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 EU enterprise data center. Further, migrating French enterprise workloads to AWS would result in energy savings of up to 78% and would reduce annual carbon emissions by up to 233 metric tons of CO2 per megawatt.** 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. We run servers at higher usage levels than enterprise data centers, leveraging the ability to share and dynamically allocate resources in the cloud. Our Graviton3 processor is an example of how we build hardware with sustainability in mind. Graviton3-based Amazon Elastic Compute Cloud (Amazon EC2) instances use up to 60% less energy for the same performance than comparable Amazon EC2 instances. In addition to energy reduction, Graviton3 offers 25% 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 we 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 French customers move their workloads from enterprise data centers to AWS, the carbon footprint of these workloads is reduced due to much lower energy consumption.

Reducing Water Usage in AWS Data Centers

Recognizing the criticality of sustainable water management, AWS employs multiple initiatives to improve water use efficiency and to reduce the use of potable (drinking) water for cooling data centers. AWS develops a regional water use strategy by evaluating climate patterns for each AWS Region, local water management and availability, and the opportunity to conserve drinking water sources.

AWS has demonstrated a commitment to water stewardship by using reclaimed or recycled water, instead of potable water, in multiple AWS Regions. A key component of our water use strategy focuses on working with local utilities to expand the use of reclaimed water. In some AWS Regions, AWS has installed on-site water treatment systems to remove scale-forming minerals, enabling us to use water for more cycles in our cooling units and continue to reduce our water footprint.

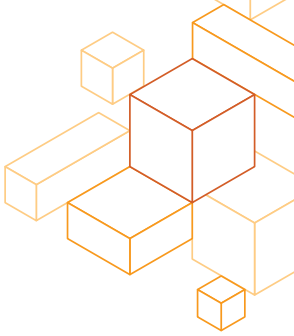
Helping Customers Become Sustainable Cloud Users

In December 2021, AWS introduced the Sustainability Pillar to our AWS Well-Architected Framework. The framework helps customers improve their cloud architecture, consists of design principles, questions, and provides 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. It also helps to reduce their carbon footprint by integrating sustainability goals, impact measurements, maximized workloads, managed services, and actions to reduce downstream energy usage. Our Sustainability Pillar is another example of AWS's actions to support our customers' sustainability efforts.

In March 2022, AWS launched a 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 they show how a customer's carbon footprint will change as Amazon stays on path to powering its operations with 100% 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 our 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 Météo France, National Oceanic and Atmospheric Administration (NOAA), and National Aeronautics and Space Administration (NASA) to identify, host, and deploy key datasets in AWS Cloud, 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, we use a value added approach and the input-output multiplier methodology. 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 us to compute the gross domestic product contributed and jobs supported by investment made by AWS and our 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, we calculate the jobs supported and gross domestic product contributed locally by AWS and our supply chain. In our 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 OECD or the country's government statistical agency. Input-output tables show the impact of each unit of currency spent in one industry on all other industries. For example, a dollar spent on construction might typically be associated with 20 cents spent on electricity and other utilities. We also use internal Amazon company financial projections on AWS operations and investment associated with constructing and operating data centers.[5] We use 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.

5 The monetary figures presented in this document are derived from Amazon company management financial systems and prepared in accordance to the above methodology for calculating economic impact. Accordingly, the figures may differ from in-country statutory financial statements and reporting.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