Clearing the cloud

The urgent need for a European cloud policy that can accelerate digital innovation with security, control and choice

Report prepared for the Digital Sovereignty Summit in Munich

by Implement Consulting Group in collaboration with Google

November 2025

PREFACE

Digital innovation with security, control and choice

AI technology is a decisive source of competitiveness and economic prosperity. Capturing the benefits of AI is vital for Europe to boost its innovation.

To make digital innovation play to Europe's strengths requires a substantial build-out of cloud in Europe. To this end, the Draghi report proposed a new 'EU Cloud and AI Development Act' with several objectives, including harmonised EU rules for sensitive cloud services, a stronger Single Market free from 'gold-plated' protection, and more cooperation between the EU and the US to ensure access to cloud and data markets.

Since the Draghi report, Europe's geopolitical pressures have intensified and technological dependencies with non-EU countries continue to drive the debate on strategic autonomy. Such concerns can stall or delay the adoption of AI.

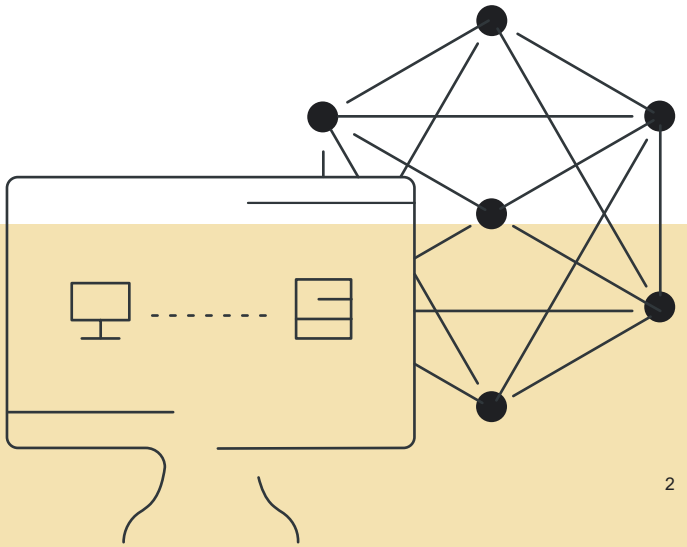
This report examines the options for Europe to boost its digital innovation in these turbulent times and remain in control of its digital development.

No country that aspires to prosperity and sovereignty can afford to be excluded from critical technologies

Mario Draghi
Speech at Rimini meeting 2025

Digital control
means Europe retains authority over essential digital technologies, data, and infrastructure; ensures security and resilience against coercion and cyber threats; and shapes its digital future in line with European values and interests.

We define **digital sovereignty** as the capacity to combine innovation — driving competitiveness, creativity, and growth — with control and choice — ensuring security, resilience, and autonomy — so that Europe can safeguard its ability to shape its digital future.



SUMMARY

Rapid expansion of cloud is needed to drive EU competitiveness and digital sovereignty

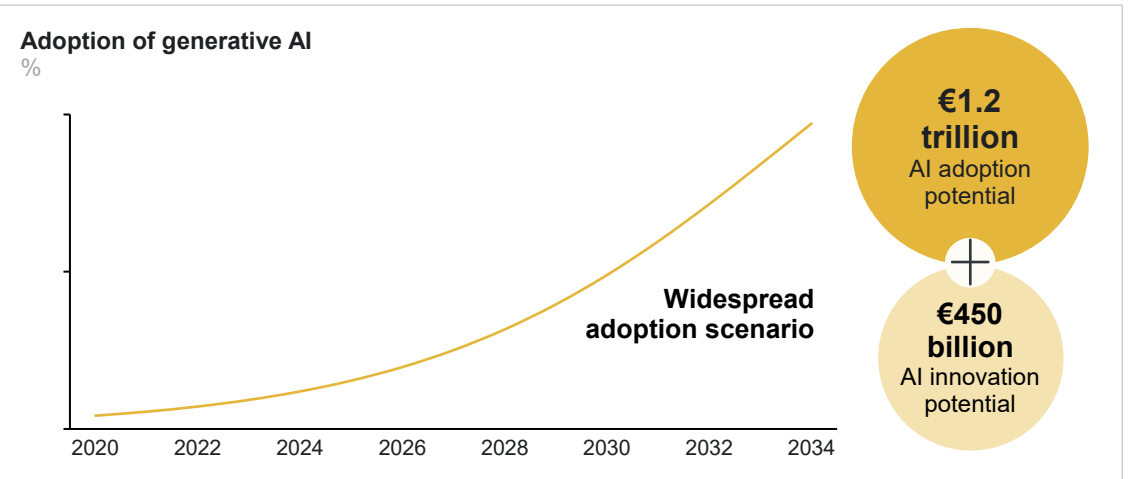
Future competitiveness depends on AI adoption and innovation. Much of Europe's future competitiveness and prosperity depends on capturing the AI opportunities within only 5-8 years. With widespread AI adoption, the EU could boost its GDP by over EUR 1.2 trillion. And by accelerating existing innovation efforts, the EU could unlock an additional EUR 450 billion.

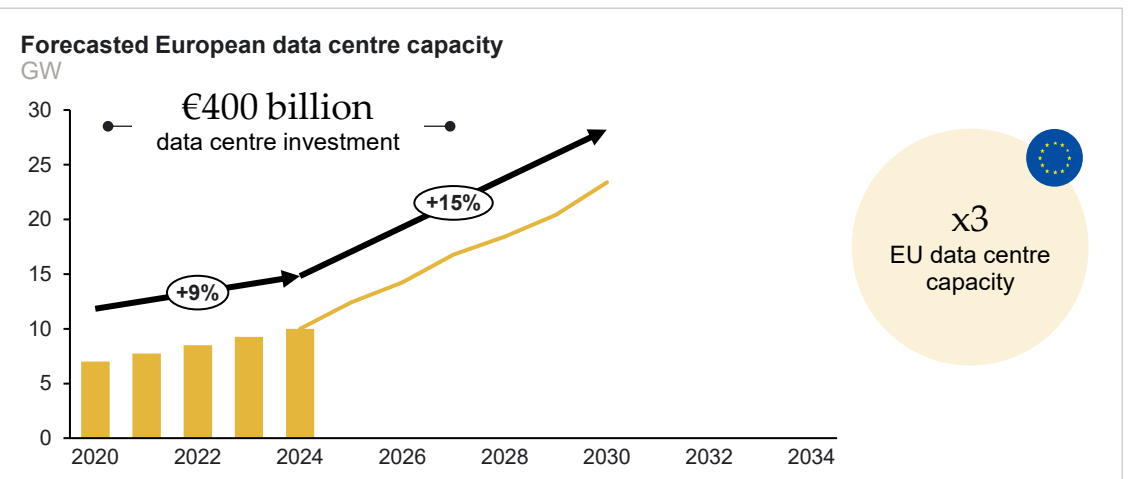
Building on European strengths within AI applications. Europe's strengths as well as the biggest global growth opportunities are in the application layer - not in replicating infrastructure or models that already exist.

The AI opportunities require expansion of cloud on EU soil. Achieving these opportunities while ensuring European control over its digital development requires a powerful cloud infrastructure and advanced cloud services on European soil. Expanding the AI value chain in the EU across infrastructure, models, and applications is paramount for achieving digital innovation with control.

A step-change in cloud investment is needed, which requires an open investment climate. To achieve the AI potential and ensure the availability of frontier digital security and control, the EU has set a goal to triple data capacity over the next 5-7 years.

We estimate that Europe needs EUR 400 billion in investment in data centre capacity alone towards 2030. EU data centre investment must grow at 15% p.a. to meet the demand for secure and innovative cloud. This requires a continuation of the current, open, and pro-competitive investment regime for cloud, which is now being questioned.





SUMMARY

Digital innovation requires choice

Maintaining choice is crucial for security, prosperity, and sustainability

Digital sovereignty can be achieved with an open approach that combines the best of European innovation with world-leading technologies while ensuring European control.

Maintaining choice for European businesses of cloud providers will have huge implications for achieving the adoption and innovation opportunities from AI. This report estimates that lack of access to the most powerful AI tools and applications puts EUR 800 billion of European productivity gains at risk.

Continued choice of cloud providers will also enable access to critical cybersecurity technologies and capabilities that are five years ahead of the EU. Choice is also crucial for energy efficiency because hyperscale data centres are more efficient than the average European providers. Finally, Google's data centres in Europe leads in 24/7 carbon free energy.

Choice and openness in Europe's cloud market is needed to attract investment in AI and cloud infrastructure. Continued underinvestment will constrain digital innovation and/or increase Europe's digital dependencies and thereby jeopardising security.

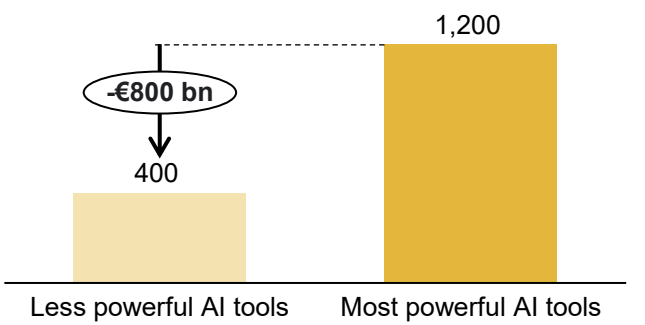
A closed approach, limiting choice to an "EU-only" tech stack would put these opportunities at risk and make it more difficult to achieve an innovative, secure, efficient, and clean cloud in Europe.

Innovative cloud
Foster innovation and growth

€800 billion

is at risk if Europe cannot secure full access to advanced AI solutions

Estimated potentials of gen AI adoption in the EU
bEUR increase from baseline GDP after ten-year adoption period



Maintaining choice in Europe's cloud expansion is also key to achieve:

Secure cloud
Enhance security and trust

5 years

lead in critical cyber security technologies compared to EU firms

Efficient cloud
Ensure efficient buildout

8%

less data centre electricity use if hyperscalers take up their share of capacity growth

Clean cloud
Advance sustainable data centres

84%

24/7 carbon-free energy at Google's European data centres in 2024

SUMMARY

Digital sovereignty is innovation *with* control

Digital sovereignty safeguards competitiveness and security

Digital sovereignty is not a choice between innovation and control — it is *both*. Europe can in fact only achieve digital sovereignty when combining innovation with control.

- Innovation without control would expose Europe to cyber vulnerabilities and coercion risks if partnerships with non-EU providers are not underpinned by the necessary controls on data, software, and hardware.
- Control without innovation would slow growth and waste resources if digital sovereignty is ill-defined in ways that limit choice and blocks access to the most innovative digital solutions and offerings of which some are from non-EU providers.

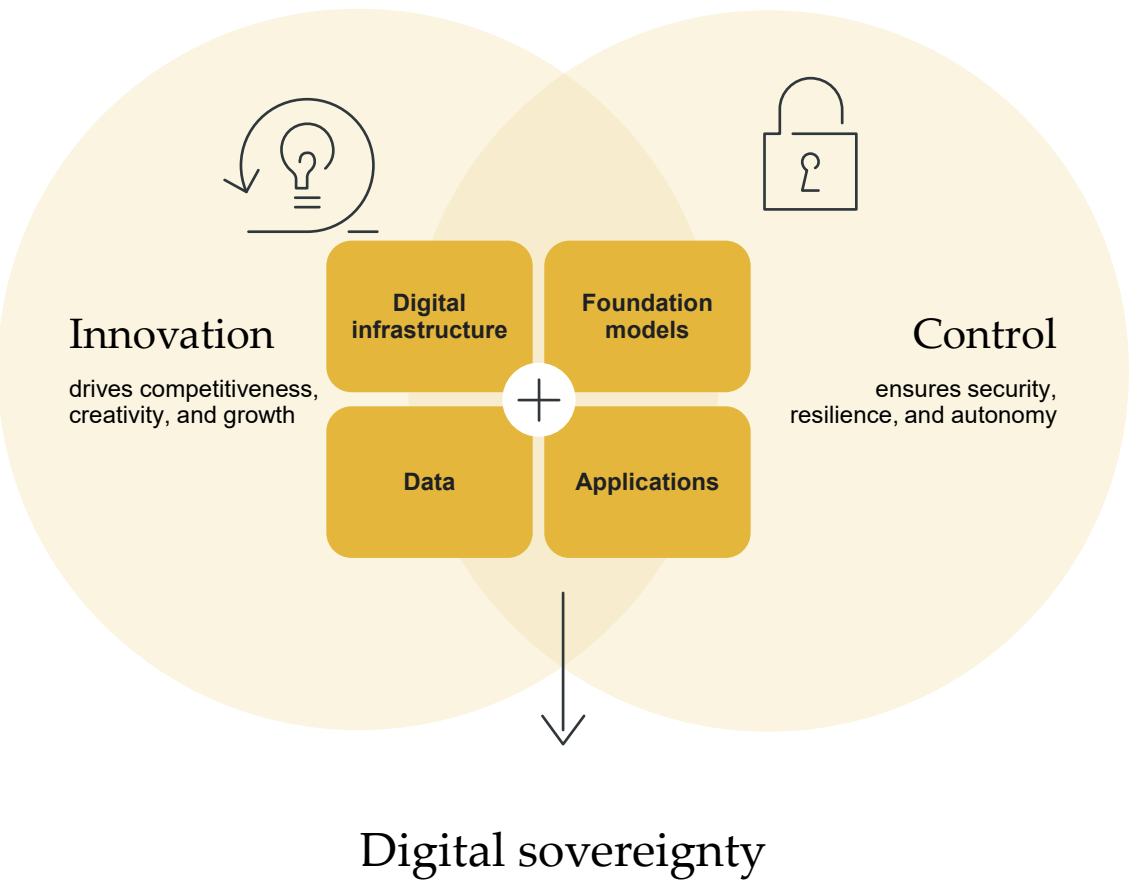
Digital sovereignty takes more than chips and cables

Innovation does not come with digital infrastructure alone just as servers and processors alone will not secure European control.

Cloud based digital innovation and security comes from combining digital infrastructure with models, data and advanced applications to create impactful adoption.

Europe must walk its own path, embracing openness, quick decision-making, and strategic investment while applying smart regulation that governs outcomes, not ideas.

Christian Klein, Chief Executive, SAP
in the Economist, 2025



Acceleration of the AI opportunities requires cloud clarity now

CALL TO ACTION

Create cloud clarity now to speed up private investment in innovation with control

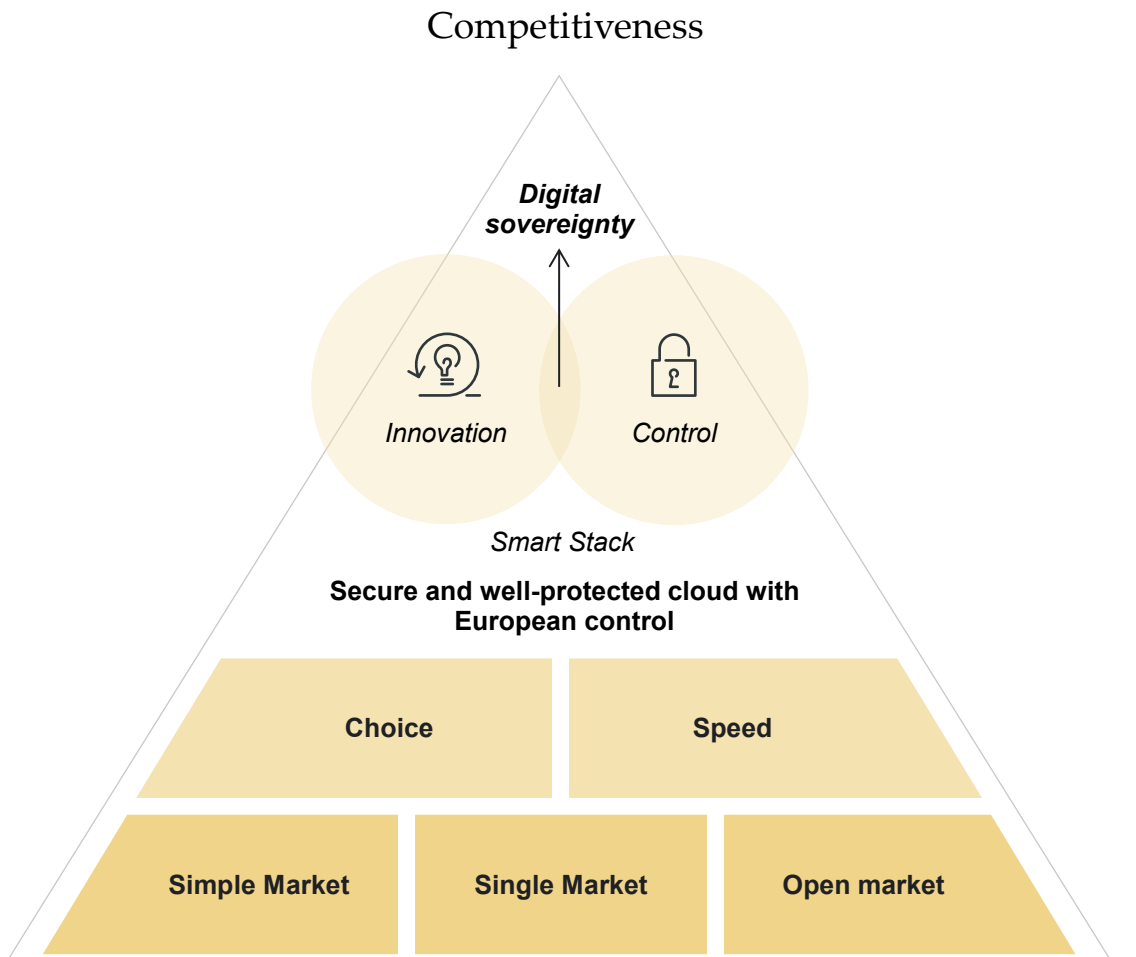
Europe's overall policy line urgently needs clarity with respect to choice, competition, and regulation of the cloud market. The policy line will largely determine the future of Europe's ability to remain in control of its digital development while staying competitive by leveraging world-leading technologies.

The key objectives of the policies to support innovation with control should be:

- *Choice:* A competitive market for digital technologies as the most powerful engine for innovation.
- *Speed:* Europe needs to capture the AI innovation opportunity within the next 5-8 years.

To achieve this innovative, secure and well-protected cloud with European control, the EU must be a:

- *Simple market:* Simplification of digital rules is needed to drive digital innovation.
- *Single market:* A unified cloud market is much more attractive for investment and can foster AI adoption and innovation.
- *Open market:* Access to the most powerful digital technologies is key for Europe's digital innovation opportunities and AI application leadership.



Contents

1 Introduction 8

2 Success criteria for Europe’s cloud expansion 22

3 Secure cloud 25

4 Innovative cloud 30

5 Efficient cloud 36

6 Clean cloud 40

7 Cloud clarity 44

PART 1

Introduction

Cloud infrastructure is vital for digital innovation *and* digital control and Europe must succeed on both to remain sovereign

> *A sustainable digital infrastructure for connectivity, microelectronics, and the ability to process big data are critical enablers for taking advantage of the benefits of digitalisation, for further technological developments and for digital leadership by the Union.*
>
> **The European Commission**
>
> *Digital Decade Policy Programme 2030*

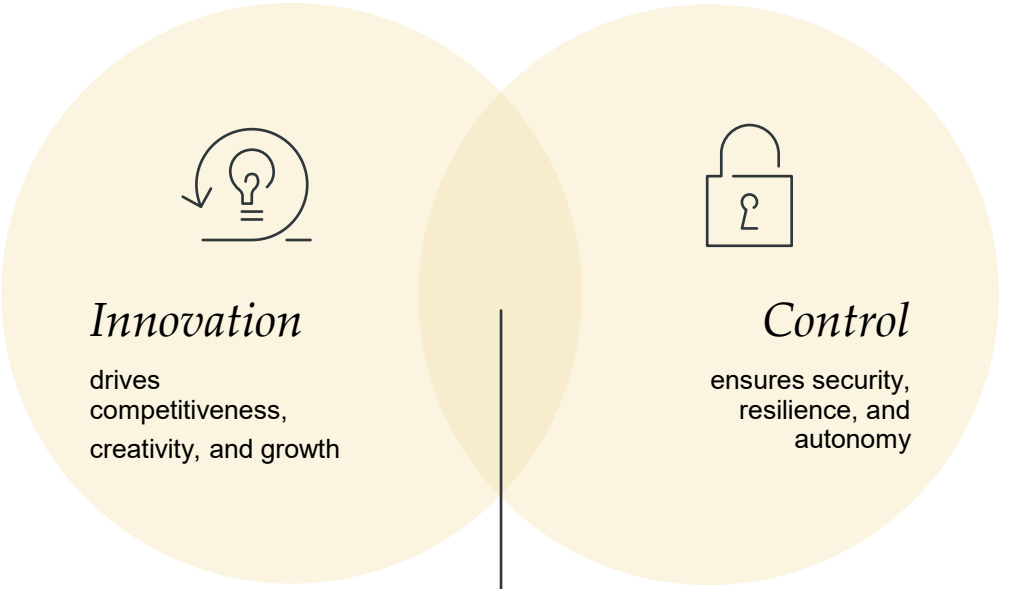
Digital sovereignty is innovation *with* control

Generative AI is becoming a cornerstone of European innovation and competitiveness. Yet, discussions around its potential have increasingly revealed what appears to be a **dichotomy**: the promise of innovation versus the need for control.

In recent years, the debate has shifted toward **digital sovereignty** — a concept tied to security, control, and strategic autonomy. While the emphasis on digital sovereignty may appear to conflict with fostering open digital innovation, the two can coexist. The key lies in a policy regime that ensures control without stifling innovation, allowing Europe to reap the benefits of AI while safeguarding its strategic interests.

This report examines how Europe can best navigate these important choices and gain both competitiveness and security in turbulent times.

Digital sovereignty is not about choosing between innovation and control — it is about combining both to safeguard competitiveness and security.



Risk of

Innovation without control

…would expose Europe to cyber vulnerabilities and coercion risks if partnerships with non-EU providers are not underpinned by the necessary controls on data, software and hardware.

Digital sovereignty

combines innovation with control

Risk of

Control without innovation

…would slow growth and waste resources if digital sovereignty is ill-defined in ways that limit choice and blocks access to the most innovative digital solutions and offerings of which some are from non-EU providers.

Cloud-enabled AI is essential for addressing Europe's innovation gap

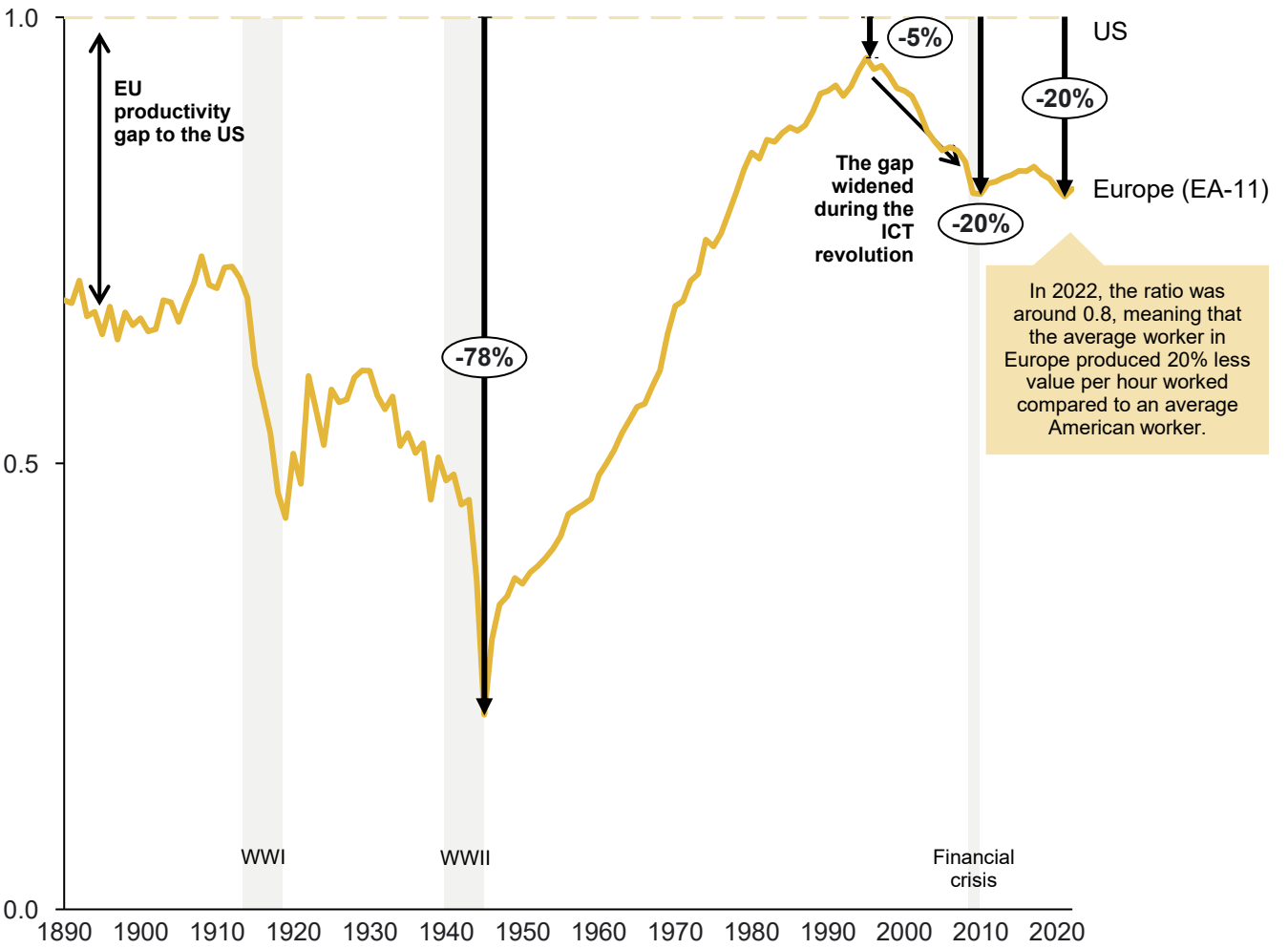
Over the past two decades, economic growth in the EU has persistently been slower than that of the US, and today, EU GDP per capita is 34% lower.

Around 70% of the gap in per capita GDP to the US is explained by lower productivity in the EU, which in 2022 stood 20% lower in the EU than in the US. The EU's relative productivity slowdown since the 1990s is primarily explained by its lag in innovation.

AI constitutes a major chance to close this innovation gap with the US. Specifically, the adoption and use of artificial intelligence represents a **EUR 1.2 trillion** economic opportunity for the EU, with cloud as its essential enabler.

Cloud is also essential for Europe's AI innovation potential, which represents another **EUR 450 billion** in potential EU growth.

Relative labour productivity
Ratio of EU to US hourly labour productivity



Note: The data for Europe covers 11 of the current euro area countries (EA-11), namely Austria, Belgium, Germany, Spain, Finland, France, Greece, Ireland, Italy, the Netherlands and Portugal.
Source: Implement Economics based on data from Long-Term Productivity Database (A. Bergeaud, G. Cette and R. Lecat), which uses GDP per hour worked in USD 2010 PPP and Draghi (2024).

Cloud already plays a crucial role in our daily lives and in many societal functions that benefit Europeans every day

Data centres are the physical infrastructure that make the cloud work. They are crucial for Europe, powering everything from business operations to daily digital tasks for Europeans planning their transport via an app or shopping online.

Cloud extends beyond the infrastructure, it includes data services, networking, and advanced cybersecurity – all delivered with scalability and global accessibility essential to power AI and drive innovation.

The bulk of the cloud capacity today is used for other purposes than AI. More than 95% of the power consumption in European data centres in 2023 is estimated to be used for non-AI / traditional cloud purposes.

Cloud connects highly reliable compute…

The cloud infrastructure is connected by thousands of computers, or servers, located in data centres to provide on-demand computing resources over the internet. These resources include storage, processing power, and applications.

Businesses of all kinds connect to data centres via high-speed networks.

Relative to on-premise solutions cloud eliminates large upfront capital costs, provides scalability, delivers world class cybersecurity capabilities, improves reliability through built-in redundancy and automated backups, and offers global accessibility from anywhere.

… to support organisations, businesses and citizens solving critical tasks every day

Public sector and businesses

The cloud support and enhance key functions across sectors…

Health care	Education	Retail	Public adm.
			
Quick access to electronic health records and cloud-based imaging.	Streaming of digital learning materials, and fully remote learning.	E-commerce platforms, real-time inventory management.	Online self-service and GDPR-secure backups and operations.

Citizens

Europeans are connected to the cloud many times a day including when they…

- Check the weather forecast in an app
- Plan their transport in an app
- Use email and attend virtual meetings
- Upload photos to the cloud
- Order groceries online
- Use social media

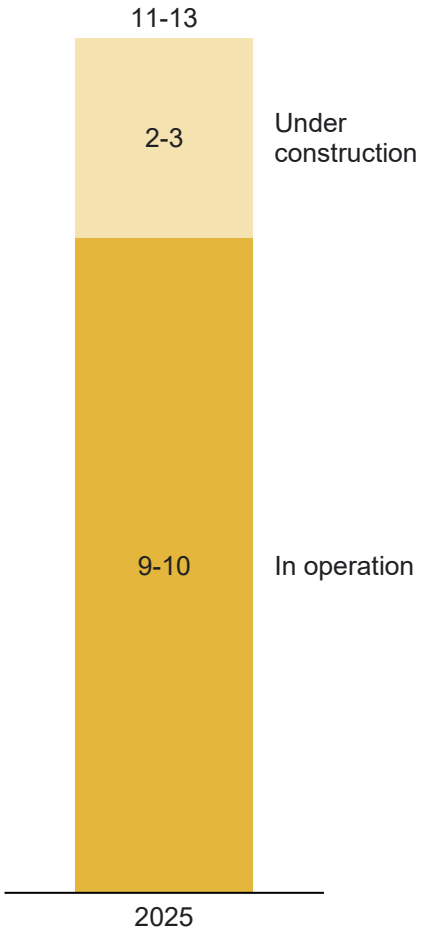
Note: All cloud services in Europe must be GDPR compliant.
Source: Implement Economics based on Google, Netflix, Dgtl Infra, ComputerWorld, and Microsoft,

Cloud infrastructure is already well established across Europe with +2000 data centres and ~200 hyperscale centres hosting 9-10GW

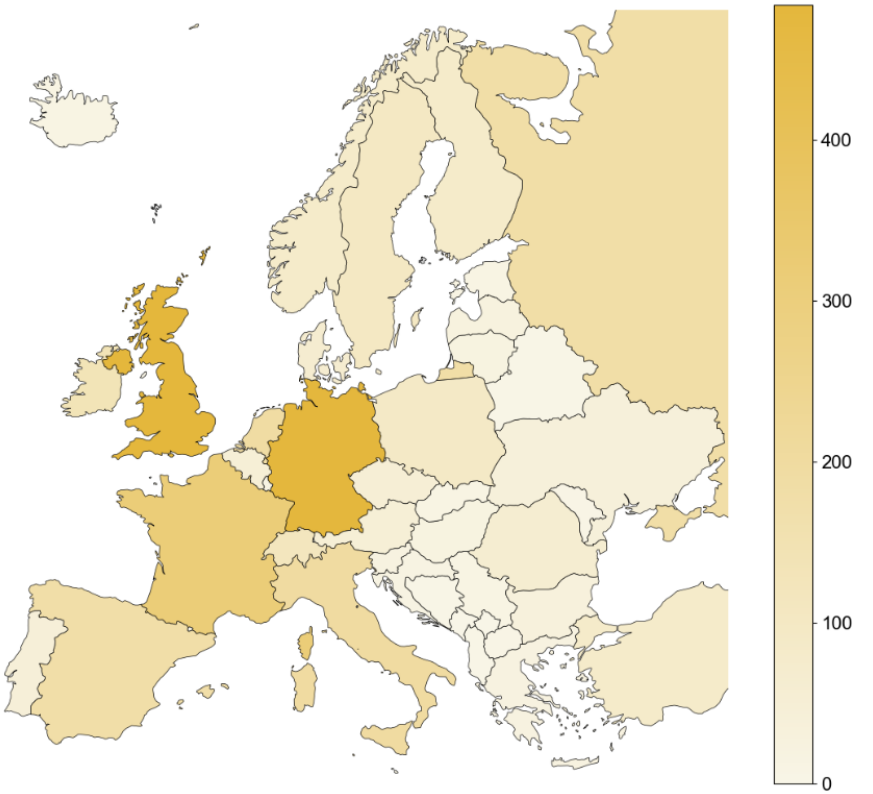
Europe incl. EU27, UK, Switzerland, and Norway in 2024, hosts between 2,000-3,000 data centres of which around 200 hyperscale data centres, defined by IDC as having more than 5,000 servers and above 930 square metres.

European data centre capacity is particularly concentrated in the FLAP-D region (Frankfurt, London, Amsterdam, Paris, and Dublin). In 2024, the FLAP-D region had a total data centre capacity of 3.2 GW equivalent to around 30-35% of Europe's total capacity.

European data centre IT capacity
GW



European data centre infrastructure, 2025
Number of data centres per country



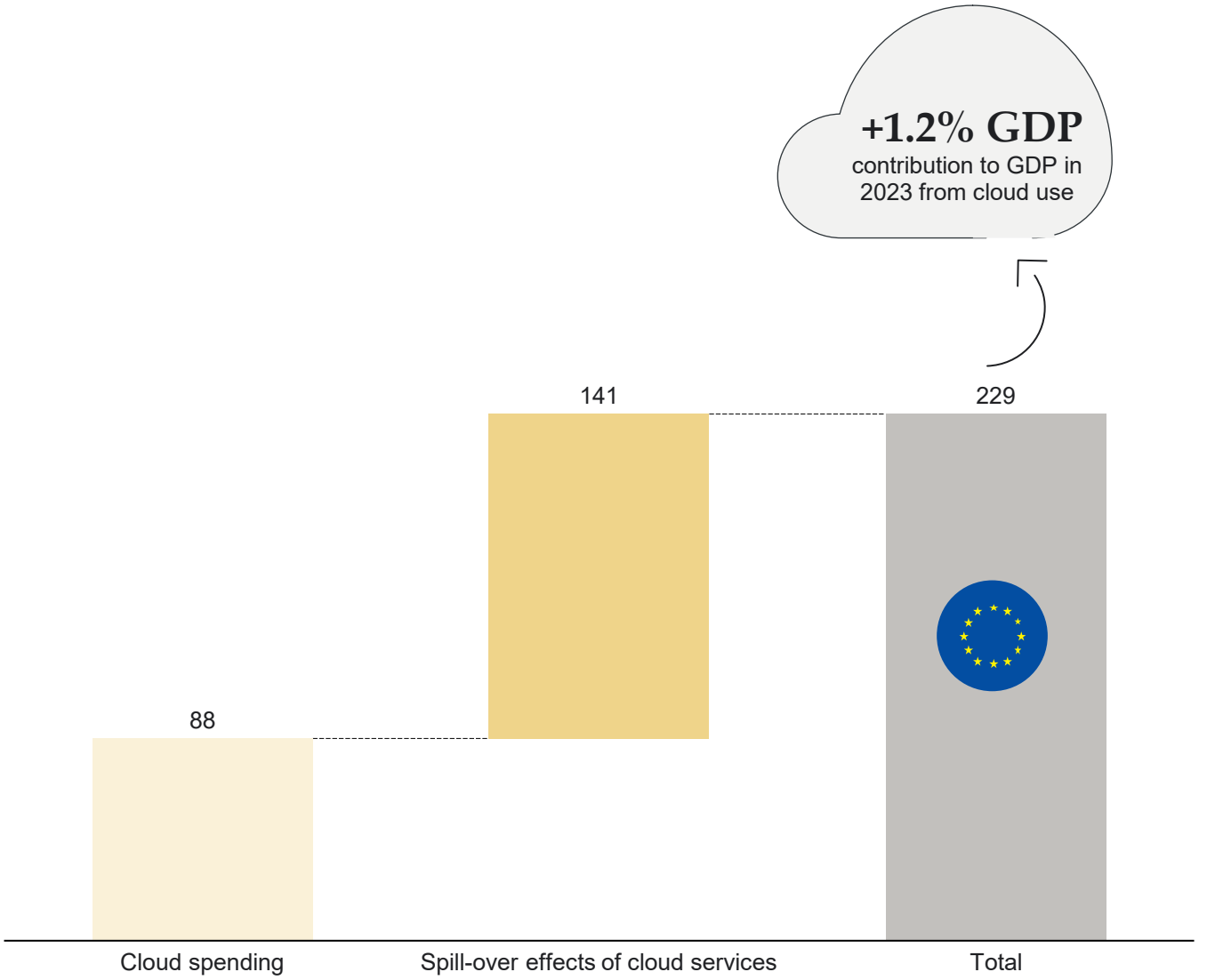
Note: In a data centre, installed IT capacity refers to the total rated capacity of servers, storage, and networking devices and is measured in megawatts (MW)
Sources: Implement Economics based on the International Data Corporation (IDC), Statista, Synergy Research Group, Cushman & Wakefield, ICIS, and Data Centre Map.

Cloud already contributes 1.2% to EU GDP, driving broader productivity in the digital economy

OECD shows that a 10-percentage point increase in cloud adoption raises firm-level productivity by about 3.5%.

A recent study confirms this finding, showing that cloud usage contributed approximately EUR 229 billion to GDP in the EU in 2023 corresponding to 1.2% of GDP, even before the broad emergence of generative AI. The estimate includes both direct factors like cloud revenue, firm spending on cloud services, but also spill-over effects on labour productivity gains from e.g. the use of Big Data and AI.

European GDP contribution from cloud, 2023
EUR billion



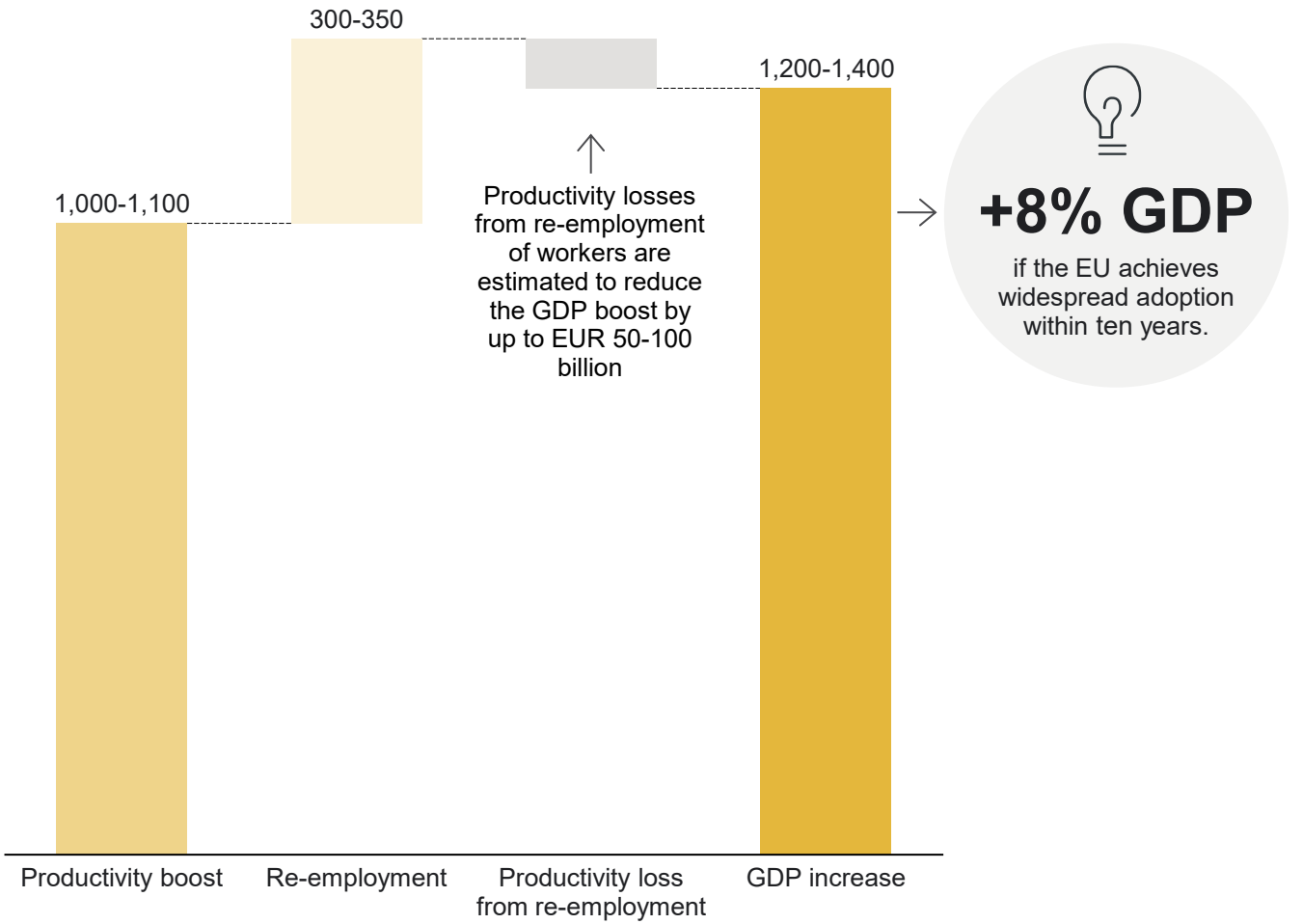
Note: TAS quantifies the GDP contribution of cloud globally and regionally using a structural simultaneous equation model where cloud adoption and AI are included as factors in total factor productivity, and the parameters are estimated via 3-Stage Least Squares (3SLS) with country- and sector-specific fixed effects to quantify cloud computing's contribution to GDP.
Source: Implement Economics based on OECD, Goldman Sachs and TAS.

Generative AI presents a EUR 1.2 trillion opportunity for the EU and cloud is the key enabler

Cloud and AI go hand in hand. Beyond enabling adoption, AI and cloud are key to accelerating innovation and strengthening competitiveness in key sectors over the coming decade.

Importantly, cloud and AI are **mutually reinforcing**: cloud unlocks AI, and the payoff from cloud is greatest where AI adoption is strongest — together amplifying Europe's digital growth.

The potential impact of generative AI on GDP in the EU in a widespread adoption scenario
EUR billion increase from baseline GDP after a ten-year adoption period



Note: The estimate assumes widespread adoption of generative AI over a ten-year period. There is much uncertainty around the capability and adoption timeline of generative AI. The size of the productivity boost depends on the difficulty level of tasks that generative AI will be able to complete and the number of jobs it can automate. GDP is in 2022 levels. The average number of work activities that potentially can be performed by generative AI across all types of tasks for both complemented and highly exposed workers corresponds to 20-25%. Our estimate is the isolated potential of generative AI. The estimated boost from generative AI ma not be fully additive to GDP trends, as the GDP forecast already assumes a growth contribution from new technologies and generative AI may substitute some of that. Also, the boost from generative AI may be partiall offset by an underlying growth slowdown.
Source: Implement Economics based on Eurostat, O*Net, Briggs and Kodnani (2023a), BNP Paribas (2023) and Dell'Acqua et al. (2023).

The single biggest AI opportunity is in the public sector and the potential across EU is EUR 300 billion

Research by Implement Economics shows that generative AI is a huge economic opportunity for the public sector across all EU countries.

For most countries, the public sector accounts for 20-25% of this opportunity.

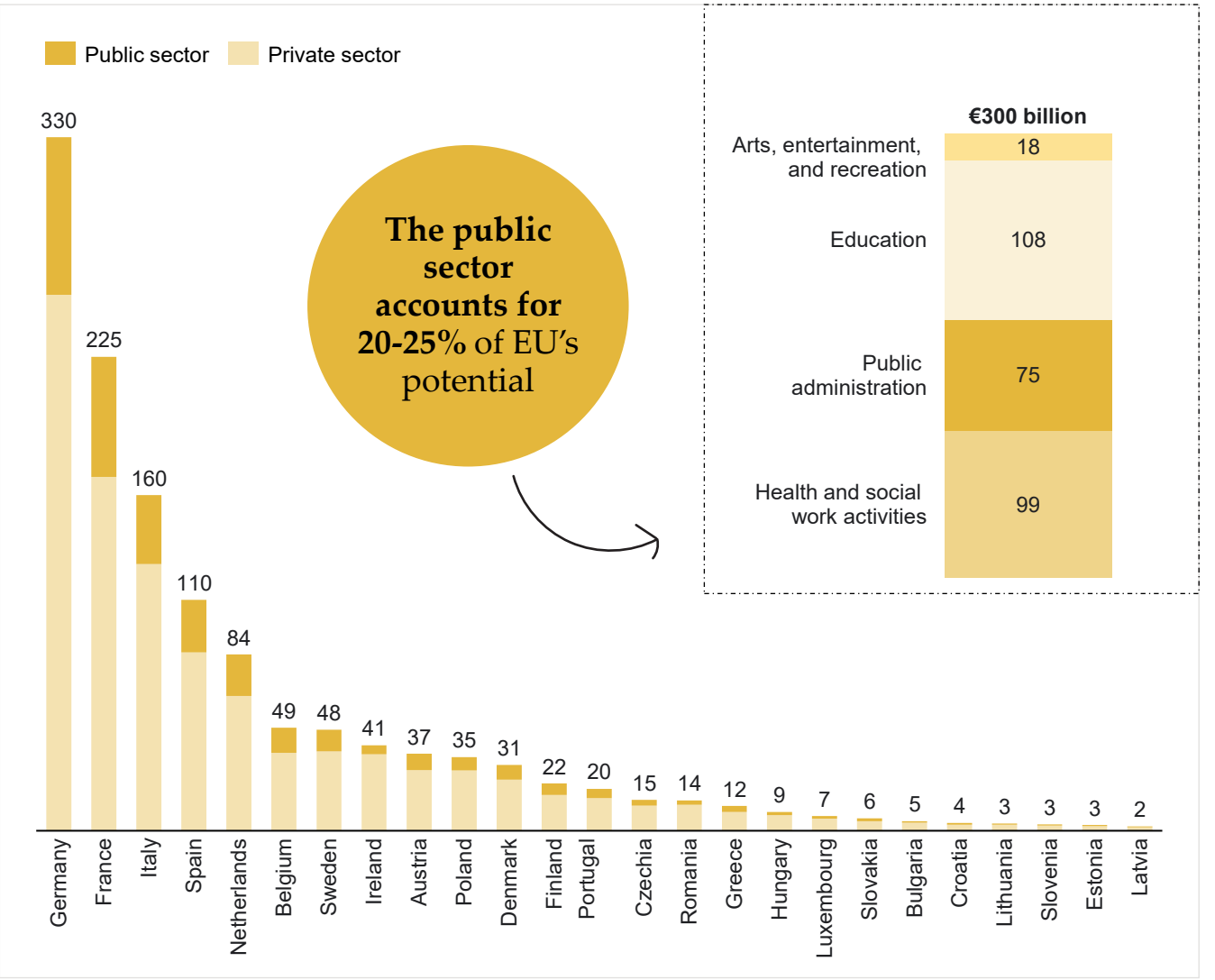
Public administrations are a natural starting point, as cross-cutting tasks create strong opportunities to scale AI applications.

Unlocking this potential will require efficient cloud solutions that give Europe access to best-in-class capabilities.

Pilot case:

Germany's Bundeswehr is working with Google Cloud to build a fully air-gapped sovereign cloud inside military data centres. The project aims to modernise IT and support sensitive workloads such as logistics, SAP, and AI services by 2027.

GDP potential of generative AI
EUR billion



Public sector GDP potential of generative AI
EUR billion

Note: The potential in the public sector includes: health and social work, public administration, education, and arts and recreation.
Source: Implement Economics based on Eurostat, O*Net, Briggs and Kodnani (2023a).

The AI market is set for massive growth with 75% of the opportunity for the EU in AI applications and services

The European AI market is expected to grow rapidly at an average growth rate of 18% per year in the coming decade. This includes growing revenues from AI infrastructure, AI models, and not least from applications and services, which is expected to account for the majority of the growth.

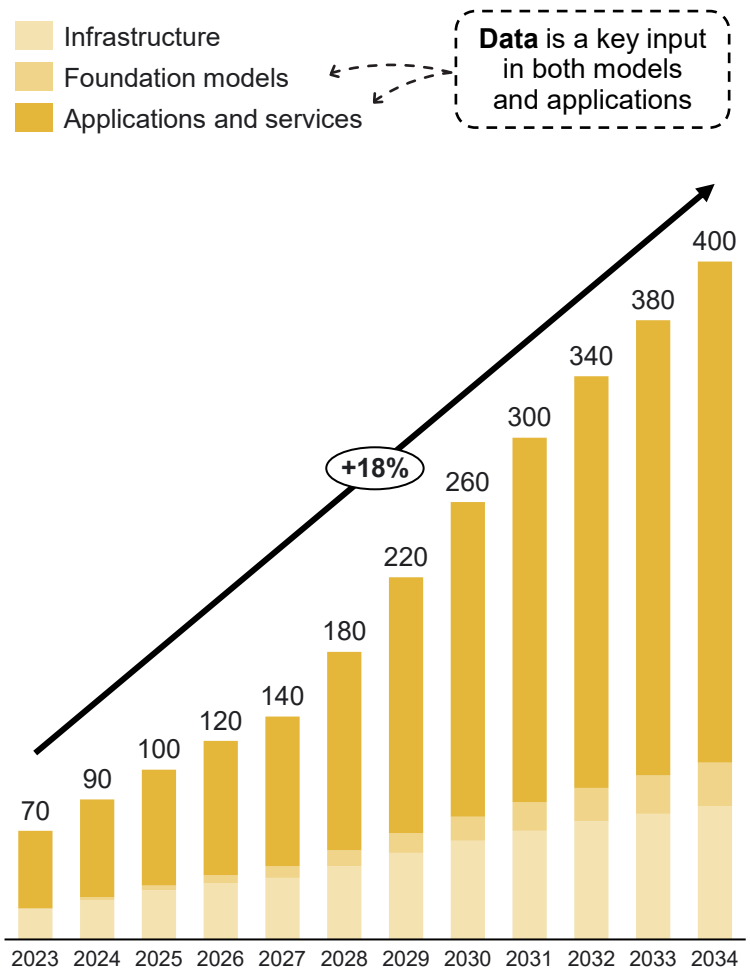
This is also where the majority of AI venture capital funding (85%) is flowing in Europe in recent years.

Data is a key input for both models and applications.

The forecasted AI growth assumes that Europe has access to all available AI providers and the best solutions in an open and competitive market.

A stronger AI value chain will not only drive direct economic value but also accelerate AI adoption across sectors, unlocking broader productivity, innovation, and long-term growth.

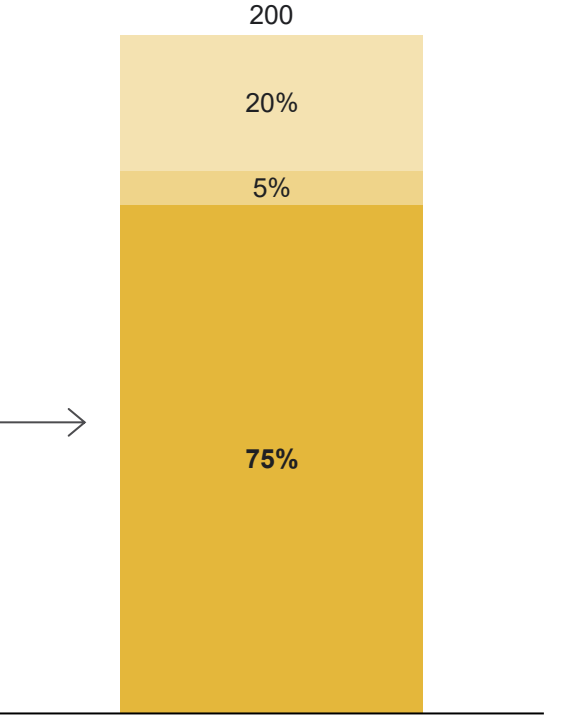
Forecasted European revenue in the AI market
EUR billion



Annual contribution to EU GDP by 2034
EUR billion

200 bEUR
in GDP contribution annually if Europe builds on its strengths in the AI value chain.

75%
of EU's opportunity in the AI value is in applications and services.



Note: Revenue numbers are converted to GVA using the latest available data (2022) for the ratio between value added and net turnover for the EU27's Computer programming, consultancy and related services sector from Eurostat. Economic effects are calculated on a Gross Value Added (GVA) basis and then converted to Gross Domestic Product (GDP) using the EU27 GVA-to-GDP ratio from 2024. GDP equals GVA by adding net product taxes.
Source: Implement Economics based on Bloomberg, Dealroom,, Stanford University, Statista, Draghi (2024), Goldman Sachs, European Commission, and Eurostat.

Europe has underinvested in AI and cloud and is falling behind on technology innovation

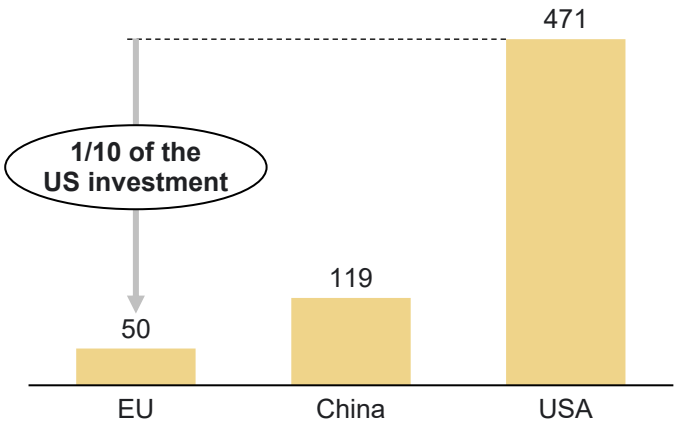
Europe has underinvested in cloud and AI compared to global peers and the capacity gap has increased over the last four years. This is largely due to slower build-out speeds, underpinned by a significant disparity in private investment. Since 2013, the EU has attracted around 10% of the private AI investment seen in the US.

Europe's innovation gap is also widening. A survey of 383 technology experts indicates that for the EU to build a strong position in critical technologies, it will require a sustained effort over several years, even with top political priority.

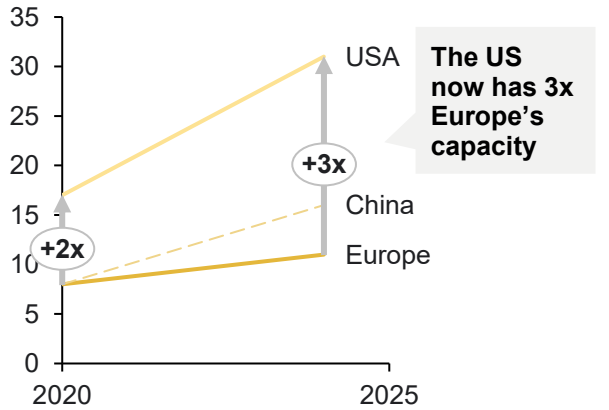
Underinvestment and lagging innovation are stalling Europe's digital progress and weakening its ability to stay in control. Europe must urgently attract more cloud investment, as robust cloud infrastructure is essential to unlock Europe's substantial growth opportunities in applications and services and to drive AI innovation and adoption across the economy.

EU has only 10% **of the US's AI investment**

Private investment in AI cumulative, 2013-24
Billion USD

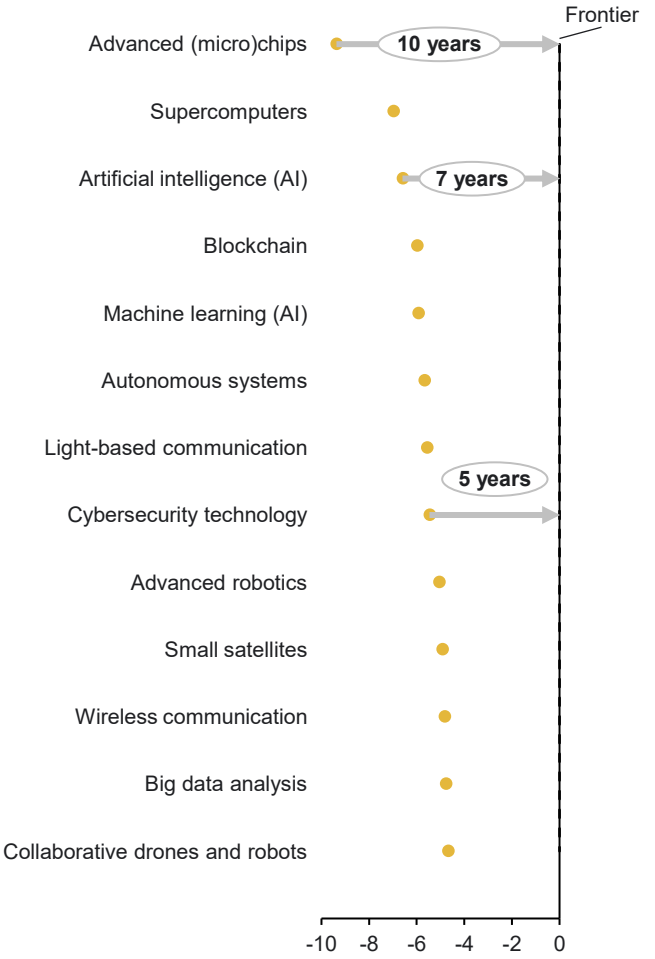


Data centres capacity installed
GW



Europe is **5-10 years behind** on frontier innovation in critical technologies

Number of years EU is behind/ it would take EU to build a strong position with top priority[1]



Note: 1) Based on survey of technology experts asking: "How long would you estimate it would take for the EU to build a strong position within the technologies, if it were given top political priority?" The graph shows the midpoint of the time-range responses.
Sources: Implement Economics based on Stanford HAI, IEA, and Danish Society of Engineers.

No country or region can be self-sufficient in digital innovation

Innovation does not come with digital infrastructure alone.

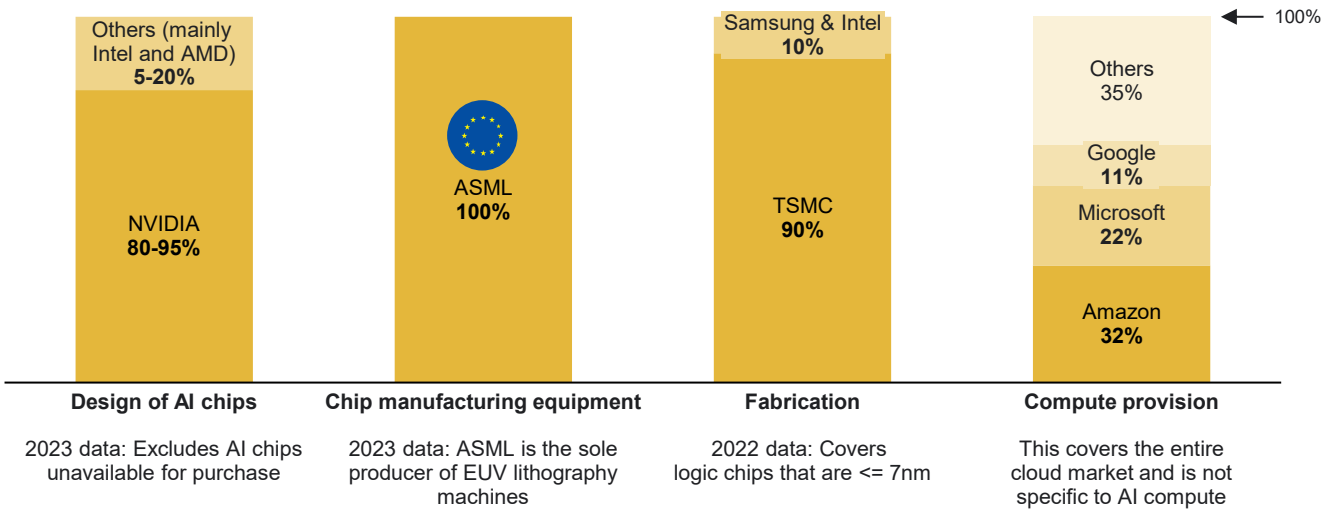
Digital infrastructure is a necessary but not sufficient condition for innovating with AI. Innovation emerges when digital infrastructure is combined with foundation models and data to create applications for broad adoption.

Similarly, servers and processors alone will not ensure digital control and security.

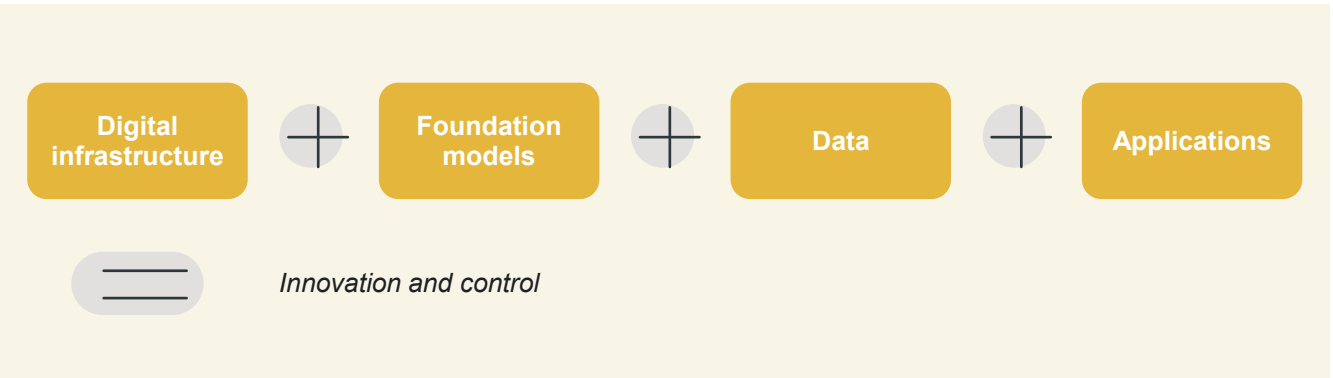
Further, the cloud value chain is globally integrated and interdependent, requiring global cooperation and partnerships for innovation to spur.

> *Anyone who believes that servers and processors alone will secure European sovereignty misunderstands the nature of global technological interdependence and overlooks Europe's true digital strengths.*
>
> **Christian Klein,** Chief Executive, SAP
> in the Economist, 2025

Global share of leading companies in AI infrastructure subsegment
Percent



Servers and processors alone will not secure European digital sovereignty.
Digital innovation *and* control comes from the ability to combine digital infrastructure with foundation models and data to create relevant applications.



Source: Implement Economics based on World Trade Organisation (WTO), Ipnest, Gartner, and Sastry et al. (2024).

To triple its data capacity in the next 5-7 years, Europe needs an immediate step-change in investment

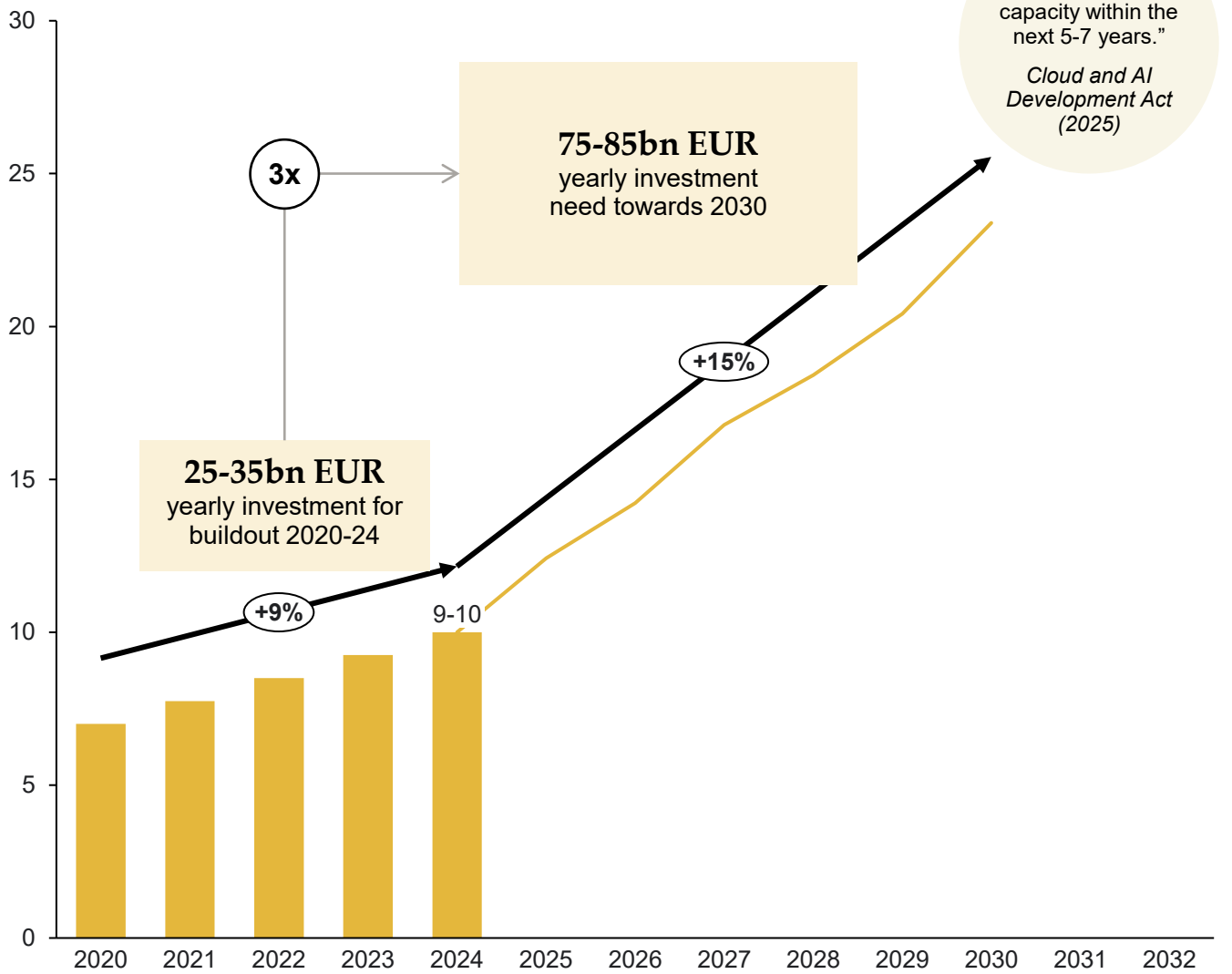
Investment in Europe's digital infrastructure must accelerate now to meet future needs. In recent years, Europe's annual data centre capacity stood at around EUR 30 billion. This needs to triple already in 2025 to meet the buildout required over the next 5-7 years. The forecasted investment assumes that Europe has access to all available cloud providers and the best solutions in an open and competitive market.

Despite the rapid growth in capacity, Europe's gap to US and China is still expected to widen especially in terms of AI training capacity.

If Europe aims to take a bigger role in the training of AI models, it will require a further increase in the investment levels now. Delaying the cloud capacity will delay European AI innovation and adoption.

Leading hyperscalers are expected to triple their investment in data centres between 2023 and 2026 and plan to invest USD 400 billion in 2026 alone according to Goldman Sachs estimates.

Forecasted European data centre capacity
GW



Note: There is uncertainty around the precise current capacity of European data centres which ranges between 8.5-10 GW for 2025. Installed IT capacity is defined by the IEA as the total rated capacity of servers, storage, and networking devices.
Source: Implement Economics based on Statista (based on revenue), IEA (based on electricity consumption), ICIS, Mordor Intelligence, Goldman Sachs (global forecast but assuming a constant European share), IDC and McKinsey.

EUR 400 billion investment needed to expand the EU data centre capacity towards 2030

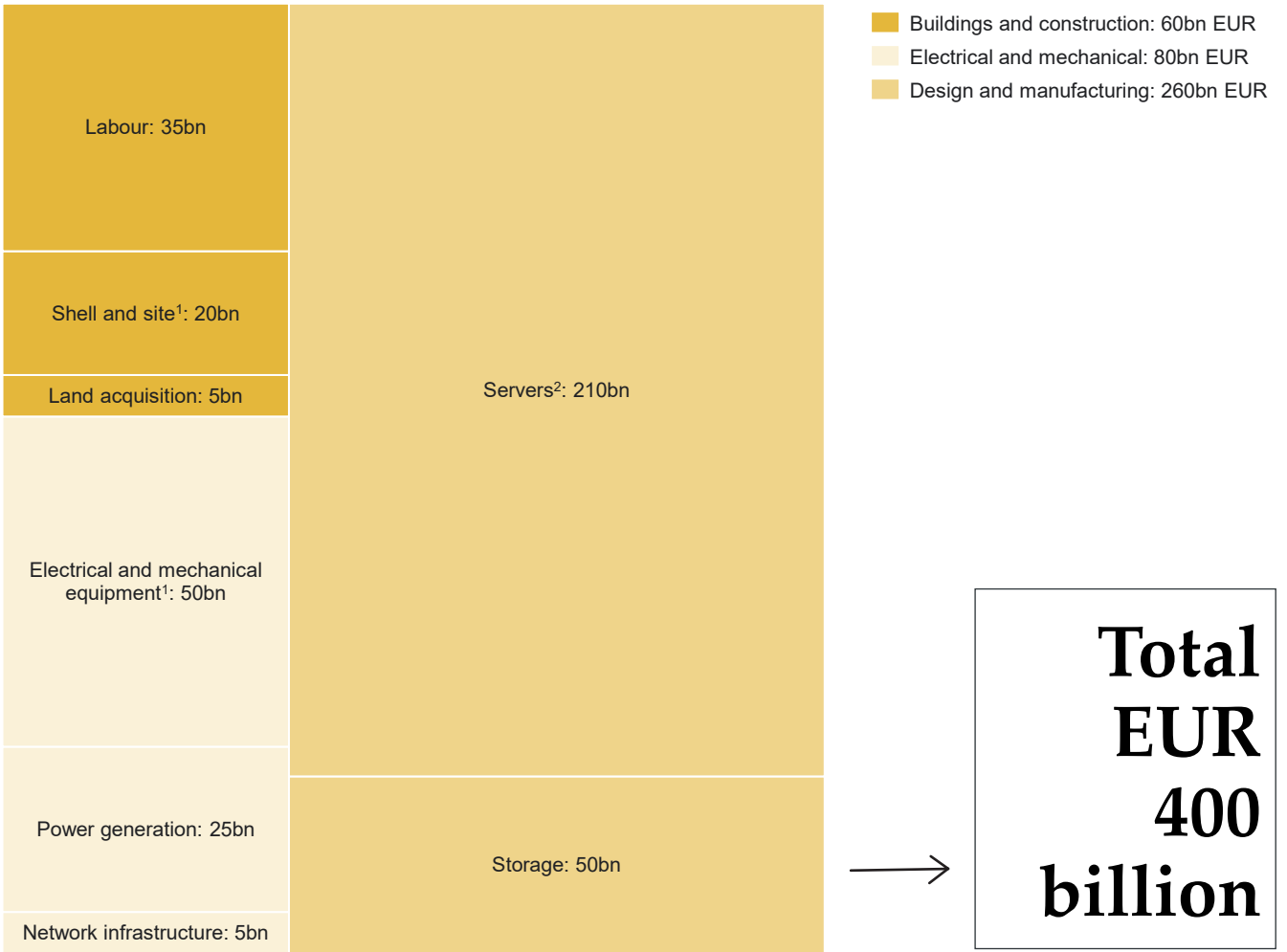
Expanding the EU data centre capacity to unlock the potential from AI technology is estimated to require a cumulative capital expenditure of EUR 400 billion in the EU to ensure the forecasted capacity towards 2030.

Servers including graphical and central processing units (GPUs and CPUs) are projected to make up around half of the total investment need.

For comparison, the Commission estimates a EUR 584 billion investment need in the European electricity grid towards 2030 to meet the REPowerEU objectives.

Note that the EUR 400 billion is only the infrastructure part and not considering the related expansion of advanced services like managed data analytics services, networking, and cyber security.

Distribution of capital expenditure in the EU across the data centre value chain, 2025-30
Billion EUR



Note: 1) Includes mechanical, electrical and plumbing. 2) Including graphics processing units (GPUs) and central processing units (CPUs).
Source: Implement Economics based on Goldman Sachs, IEA, S&P Capital IQ, European Commission, and McKinsey.

Europe is at a crucial crossroad for its cloud expansion

Europe's digital sovereignty is challenged by underinvestment and lagging digital innovation. Continuation of the status quo weakens Europe's ability to stay in control, as it will slow Europe's ability to close the innovation gap.

The question is not whether to expand Europe's cloud, but how to ensure the expansion happens with the required speed, quality, and security.

The OECD is clear. An open model with choice between European and partner providers will best ensure this. The choice that follows from the ability of businesses to exercise choice of digital services is key for access to the globally most advanced AI models. Maintaining choice in the market of cloud and AI provision is key to foster digital innovation.

Maintaining choice of providers is also a prerequisite for digital control as many of the partner solutions in the EU are among the frontier providers of cyber security and digital control solutions.

	Continue as is	**Tripling the cloud capacity in Europe over the next 5-7 years**	
	Status quo *An insufficient EU stack resulting in a widening innovation gap*	**Smart stack** *An expanded EU stack with choice between EU and non-EU providers*	**EU only stack** *A fully self-sufficient EU stack built on "EU only" products and services*
Description	**An underdeveloped European tech stack with insufficient domestic capacity**	**A European tech stack maintaining the choice between both European and partner products and services**	**A European tech stack built with limited choice of "EU only" products and services (aka EuroStack)**
Implication for innovation…	• Risk of AI innovation loss as insufficient capacity in Europe may reduce trust or increase perceived risk, which will slow AI adoption.	• Maintaining access to the full range of frontier technology, from semiconductors to applications, is key to unlocking the economic opportunities of using and innovating with cloud and AI.	• Risk of delayed or limited innovation resulting in lower economic growth compared to US and China. • Risk of significantly higher investment needs. • May require more government funding and control.
Implication for control…	• Risk of increased dependency on digital infrastructure outside Europe with higher exposure to local data regulation and law.	• Increased control over infrastructure, technology, and data with more capacity inside European borders. • Maintains access to world-leading cybersecurity and digital control solutions. • A more efficient buildout also reduces critical energy dependencies.	• Risk of increased exposure to cloud risks since Europe is currently lagging 5 years behind on frontier cyber security which adds a risk of weakening European control/resilience towards cyber attacks and hybrid warfare.

PART 2

Success criteria for Europe's cloud expansion

A secure, innovative, efficient and clean cloud is key to seizing the benefits of digital innovation and AI

> *Europe must walk its own path, embracing openness, quick decision-making and strategic investment while applying smart regulation that governs outcomes, not ideas.*
>
> **Christian Klein, CEO of SAP**
>
> *The boss of SAP on Europe's botched approach to digital sovereignty, The Economist (2025)*

The Commission is working to improve conditions to triple the European data centre capacity

As part of the 'AI Continent' initiative, the EU is launching a new act to address Europe's gap in cloud and AI infrastructure capacity, namely the EU Cloud and AI Development Act and emphasises the *"importance of increasing computational capacity in the EU as a critical component of a mature data economy which underpins many established and emerging digital use cases, particularly for AI development."*

The aim is to *"triple the EU's* data centre capacity within the next 5-7 years by promoting and creating the right conditions for attracting and supporting investment in sustainable data centres across the EU."

This is to meet the demand for AI training, fine-tuning, inference, and operations which require substantial computational resources.

Key objectives of the Cloud and AI Development Act

Enhance security and trust

Ensure that a set of narrowly defined highly critical use cases can be operated using highly secure EU based cloud capacity, while creating the conditions for the EU cloud industry to develop secure processing capabilities to serve the needs of these highly critical use cases.

Foster innovation and growth

Advance research and innovation to make the EU a leader in resource-efficient data processing infrastructures, software, and services…

Ensure efficient buildout

Triple the EU's data centre capacity within the next 5-7 years by promoting and creating the right conditions for attracting and supporting investment in sustainable data centres across the EU

Advance sustainable data centres

… advancing the sustainability of AI data processing along the compute continuum and, on the data centre level, by improving power management, cooling, general operations, and integration into energy and water systems

- The EU Commission in the preparation of the EU Cloud and AI Development Act

Source: Implement Economics based on the European Commission.

A successful expansion of cloud in Europe requires security, control and choice

The substantial productivity gains from AI depend on several conditions, where government policies have a key role to play. First and foremost, as highlighted by the OECD, governments should enable fast and widespread adoption in places where AI can make a positive impact on productivity and thereby improve societal well-being.

To enable fast and widespread AI adoption, the digital infrastructure needs to be able to expand with speed and efficiency. As pointed out by the OECD, the choice that follows from open borders for digital services facilitate access to the globally most advanced AI models. Maintaining choice in the market of cloud and AI provision is key to ensure quality, speed, and access.

Robust digital infrastructure and clear regulations and lower overall uncertainty about the technology are essential. Safety, reliability, and privacy must also be addressed to build trust in cloud infrastructure and AI technologies, both among firms and consumers, which is key to enable strong macro-level productivity gains.

Four success criteria for the EUR 400 billion investment needed to scale up the cloud infrastructure in the EU:

Maintaining choice, speed and private investment in Europe's cloud infrastructure

Successful cloud expansion

Secure cloud

Europe needs a secure state-of-the-art cloud infrastructure to enhance trust in AI and cloud solutions which is key for adoption.

Innovative cloud

The cloud infrastructure must in itself be innovative and able to host and operate the most advanced AI models and tools.

Efficient cloud

Europe needs an efficient cloud infrastructure and with continued incentive for private investment and competition.

Clean cloud

Cloud consumes a lot of power and Europe will need the most energy-efficient cloud and massive investment in renewables.

Key for seizing the competitiveness gains from digital innovation in Europe

Source: Implement Economics based on OECD.

PART 3

Secure cloud

- Europe needs modern state-of-the-art cloud infrastructure to ensure digital security, control, and choice

Cloud ensures the best cyber security for EU businesses and public institutions

Modern cloud solutions are protected against a range of hybrid threats, including attempts by foreign powers to gain strategic advantages through cyber attacks.

In addition, data centres are physically secure facilities with measures such as security guards, which protect against physical threats to which on-premise servers are less resilient.

IBM reported that organisations that implemented AI solutions for security and automation saved an average of about EUR 2 million in one year.

Modern cloud solutions offer the best cyber security for European companies and institutions, and multiple international bodies recommend cloud for this very reason.

"The Ministry of Defence is committed to utilising next-generation technology and AI to enhance our operational capabilities and ensure the security of the United Kingdom. This partnership is a critical component of our digital transformation strategy, and we are pleased to partner with Google Cloud to deliver a secure and resilient cloud environment for our highly sensitive data."

General Sir James Hockenhull, Cyber & Specialist Operations Command in *Press Release from UK Ministry of Defence (2025)*

With Google Cloud Air-Gapped as part of pCloudBw, the German Armed Forces receive a solution that they can actively control, thereby expanding their operational capability.

Frank Leidenberger, CEO of BWI in a *Press Release from BWI* – IT service provider for the German Armed Forces (2025)

Cloud computing offers a range of potential cyber security benefits for cloud consumers to leverage, providing access to advanced security technologies, shared responsibilities, fine-grained access management, comprehensive monitoring and highly redundant geographically dispersed cloud services. For many organisations, cloud computing can provide significant improvements to their cyber security, mitigating the risk of many current cyber threats.

Australian Cyber Security Centre in *Cloud assessment and authorisation (2024)*

SAS Institute

77% of government leaders listed data security as a concern in the use of generative AI in a global survey

Note: Non-English quotations are translated into English.
Source: Implement Economics based on ENISA, the National Cyber Security Centre, BWI and the Australian Cyber Security Centre.

Security and digital control must go hand in hand to support the AI opportunity in Europe

Modern cloud solutions are a prerequisite for state-of-the-art AI adoption due to their high computational and specialised hardware requirements.

To leverage these solutions organisations must have the desired level of security and control over data, operations, and technology.

The desired level of control is determined by each organisation's needs and by regulatory requirements. The need for control can vary from task to task, and there is no one-size-fits-all when it comes to digital control.

Certain tasks in for example the public sector are highly critical use cases with particularly high security needs, whereas other tasks do not require the highest degree of control.

Digital control has three dimensions:

Data controls

Access controls on who can access the data and which legal jurisdiction is data subject to?

Residency controls on where data is physically stored and processed?

Who?

Can access the data

Where?

Is the data located

Operational controls

To what extent does an organization have control over how its digital systems are operated, maintained, and monitored?

How?

Are systems run

Technological controls

How freely can public institutions choose, adapt, and replace the software that supports their services?

What?

Software can be used

Main benefits for organisations:

Data controls let customers have full control who can access their data and full assurance over data location.

Assurance that specific controls, or full cloud stack operations are handed over to a local player, to provide increased protection.

Control over hardware and software, including the location, the ability to configure platforms, interoperate and leverage multiple providers under multi-cloud, and adapt systems independently over time.

SECURITY AND DIGITAL CONTROL

Source: Implement Economics based on Google.

Cloud solutions offer varying degrees of controls across the three dimensions and organisations should take a “fit for purpose” approach

Advanced cloud providers are already offering varying degrees of control to customers to meet their varying degrees of need for control across the portfolio of workloads.

Advanced buyers of cloud services thus collaborate with their cloud providers to define detailed grids of controls for their different workloads and data. This is to ensure the most efficient and appropriate solution for each type of data and workload.

Advanced cloud providers are also helping the customers comply with the very complex set of rules and regulations on data storage and AI use in the EU.

Lack of clarity on these issues often results in hesitation and costly delays in the adoption of AI and cloud solutions.

To increase trust in cloud and AI, European organisations need clarity on security, digital control, and regulatory compliance.

Increasing degree of control ↓

Cloud solution	Data controls	Operational controls	Software controls	Fit for purpose examples of public use cases
Public cloud	Standard safeguards for international data transfers	Shared domestic regions with standard data controller oversight over cloud operations	Building on Google Cloud Open Source foundation	All traditional cloud use cases, for non-sensitive (personal) data (incl. GDPR compliance).
Data Boundary on public cloud	Assured residency and transparency over customer data, with technical protection against extraterritorial data requests.	Shared domestic regions with local support staff, and own control over encryption keys, kept out of Google's infrastructure.	Building on Google Cloud Open Source foundation.	Sensitive (personal) data use cases subject to supplementary data protection measures (health, financial, strategic IP)
Dedicated public cloud	Dedicated, local twin replica of Google Cloud, keeping all data in region.	Dedicated region operated by a local partner, legally independent of Google.	Building on Google Cloud Open Source foundation with weeks to months of operational continuity	Operators of vital importance, subject to specific data control regulations.
Private cloud	Full air gap. No network communication required.	Operated entirely by the user or local partner in full isolation.	Indefinite independent operational continuity.	Defence & Intelligence related workloads, critical services of vital importance to national security.

Sources: Implement Economics based on Google, NIST and European Commission

Organisations in search of digital transformation should assess the degree of control and consider the implications on capabilities and cost

European organisations engaging in digital innovation and transformations will encounter complex decisions to ensure the appropriate level of digital control and carefully assess which capabilities are key for success. Finally, and obviously, cost is also a factor.

As shown in our report on the AI potential for e-Governments in the EU, these considerations are particularly relevant for the public sector, and the question of security and control is a key concern that is holding public decision-makers in the EU from moving ahead with their AI ambitions.

Individual EU countries are considering a set of measures and guidelines to be applied across Member States, and some countries, such as France, impose strict nationality requirements on cloud suppliers.

This calls for the harmonisation of cloud policies in order to address the computational capacity deficit and create a trustworthy and unified set of rules for the EU cloud infrastructure.

CONTROL

- Refers to the degree of control an organization has over where data is stored, who can access it, and how the systems are operated and maintained.
- Higher controls means more control on the customer side but may come with trade-offs in flexibility, interoperability, and costly to scale.

CAPABILITIES

- Describes the range, sophistication, and scalability of services available, including access to advanced tools like cutting edge security, AI, automation and analytics.
- Broader capabilities allow for faster innovation and more complex workloads but often rely on shared environments and third-party infrastructures.

COST

- The cost-efficiency of cloud services based on the provider's infrastructure scale and service model.
- Large-scale public cloud platforms typically have lower total cost through shared infrastructure, while isolated setups reduce scale benefits and drive higher costs.

Key questions for organisations:

What degree of control do each of my use cases require across each of the three dimensions of control – knowing that one size does not fit all?

What are the key capabilities that can drive the benefits and innovation from the cloud solution for each of my applications?

What are the cost implications of the chosen degree of control and capability – aiming to avoid over-spending on unneeded control?

Source: Implement Economics based on Google and SecNumCloud.

PART 4

Innovative cloud

- The cloud infrastructure must in itself be innovative and able to host and operate the most advanced AI models and tools

Cloud is a differentiated set of specialised solutions continuously innovated to solve various tasks most efficiently

Cloud and data centres are not a single general technology with a one universal application. Different computational workloads require specialised solutions to be carried out most efficiently e.g. the training of large foundational models is most efficient carried out on AI training clusters with specialised hardware optimised for massive matrix operations, such as GPUs and TPUs.

Cloud plays a dual innovation role. Firstly, cloud is an innovation enabler through its massive remote compute access e.g. enabling the training of large foundation models or resistance to modern cyber attacks. Secondly, large innovation efforts are spent on improving the cloud systems themselves in terms of efficient processors, specialised (e.g. AI accelerator) systems, cooling techniques, energy efficient algorithms etc.

To fully unlock its full potential Europe must ensure its access to the full scope of cloud services, including AI training and inference clusters, storage, compute, data management and analytics, security, networking, and edge computing.

Different types of compute infrastructure for different tasks…

Increasingly sophisticated and innovative

Enterprise	*For internal use, including remote and branch offices.*
Colocation	*Built by colocation companies that provide retail and wholesale leasing of compute.*
Edge	*Small distributed data centres and network infrastructure to provide low latency services*
Hyperscale	*Deploys internet services and platforms at a massive scale*
AI Inference	*Runs trained AI models for real-time predictions, requiring low latency and high throughput*
AI Training	*Trains large-scale AI models, characterised by high density compute power and massive cooling*

Within each type, operators are competing on multiple aspects of both hardware and software innovation…

Aspects of computing

		Operators compete on….	*For example…*
Hardware	**Processors**	speed and efficiency of CPUs for general-purpose computing and GPUs/TPUs for parallel tasks like AI	Google, has designed a chip (Ironwood), that is 5.5 times more energy efficient than the previous generation from 2023 (TPU v5p).
	Memory	fast, high-bandwidth memory to ensure quick data access for applications.	NVIDIA's H200 GPU uses HBM3e memory, providing 4.8 TB/s of memory bandwidth, a 1.4x improvement over the H100 from 2022.
	Connectivity	speed and reliability of the internal networks that connect internal servers	Optical switches can reduce latency to microseconds and increase data transmission speeds to multiple terabits per second.
	Cooling	managing heat generated by modern hardware, allowing for higher performance and density.	Immersion cooling that is over 90% more energy efficient than traditional air cooling and can reduce cooling costs by up to 99%.
	Rack Density	packing as much computing power as possible into a single server rack.	Blade servers, a modern approach to high density, can fit 32-96 servers per rack
Software	**Datasets**	providing access to massive, curated datasets	Meta's Llama 3 was pre-trained on a dataset of 15 trillion tokens from publicly available sources, 7x larger than the dataset for Llama 2.
	AI models & algorithms	managing power consumption and workload distribution most efficiently	Google's DeepMind AI has optimised the cooling systems leading to a 15% decrease in Google's overall DC energy.
	Applications and toolkits	quality of pre-built software and APIs that developers can use to build applications	Google AI Studio allows developers to prototype and build generative AI applications quickly.

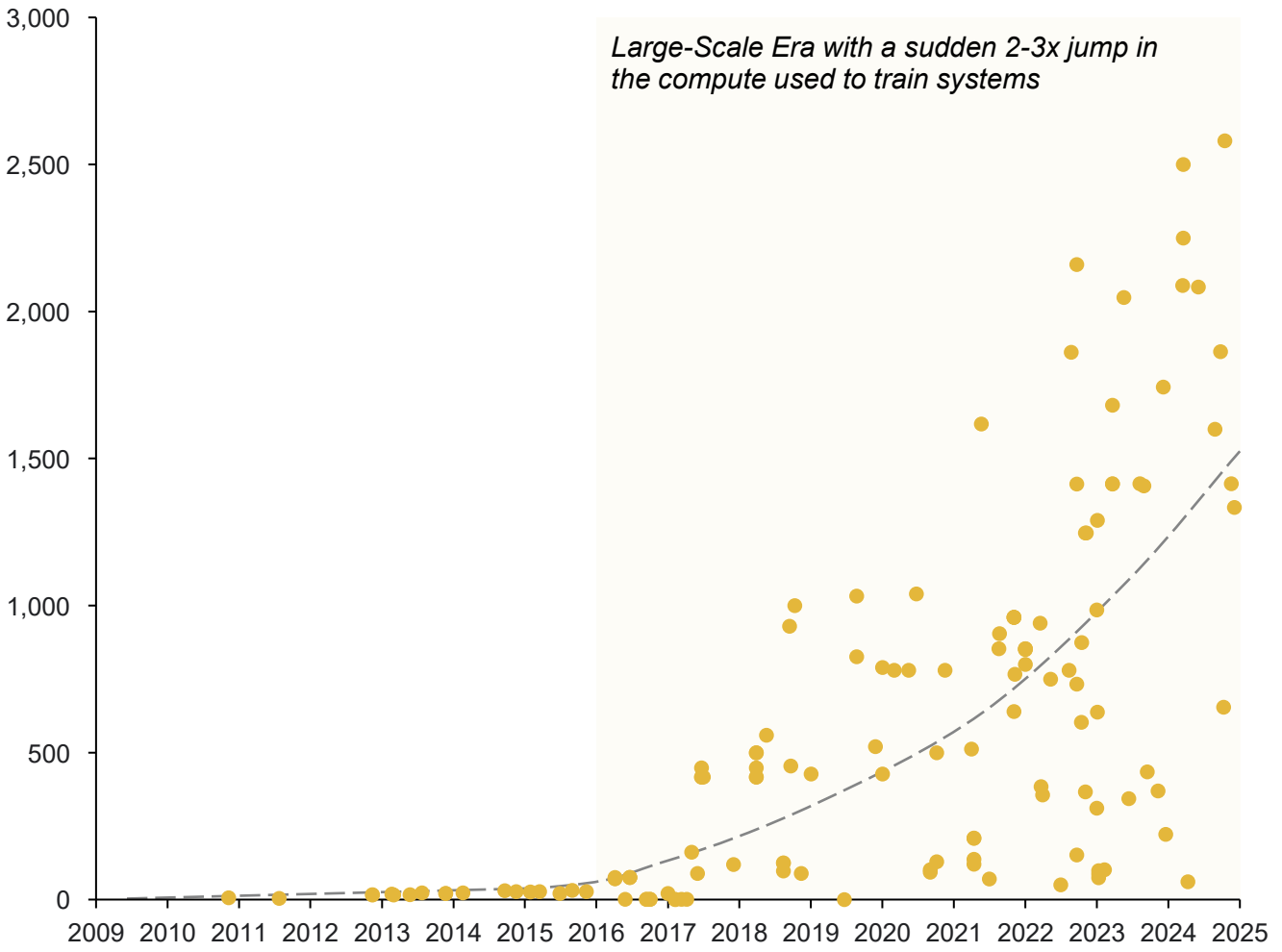
Source: Implement Economics based on IEA, Google, and NVIDIA.

Deep dive | Computer chips as a form of cloud innovation has brought significant productivity gains

A clear example of cloud-driven innovation is computer chips. Since 2016, world-leading machine learning hardware has improved energy efficiency by about 40% each year, driven largely by intense competition and innovation among manufacturers such as NVIDIA, Google and AMD.

These continuous improvements and innovations in cloud, computer chips and other hardware unlock constantly more capable AI solutions solving an increasingly wider range of tasks.

Energy efficiency in modern computer chips
GFLOPS/W



Note: GFLOPS/W is a metric for computing efficiency. It measures **gigaflops (billions of floating-point operations per second)** per **watt** of power consumed. A higher number indicates a more efficient processor.
Source: Implement Economics based on Epoch AI

Deep dive | New AI foundation models constantly being launched in a highly competitive market

The market for AI models is growing, with firms continually developing and refining models to enhance capabilities in text, image, audio, video, and specialised areas such as protein and DNA sequencing.

Model releases are frequent; the Stanford AI Index reported that 61 notable models were launched in 2024, and their size continues to increase.

Although training these systems can be costly, with GPT-4 exceeding USD 100 million, DeepSeek recently claimed to have trained its R1 model for just USD 5.6 million, achieving comparable performance. Building new generalist foundation models comes with immense financial and computational challenges with large pools of money having already been invested. Instead, the best strategic option for Europe lies in creating specialised, fine-tuned models for narrower applications, where European companies such as Mistral in defence and Aleph Alpha in government and enterprises have already demonstrated success.

Examples of generative AI models show a wide range of innovative models available for each modality

	Text	Image	Audio or music	3-D	Video	Protein structures or DNA sequences
OpenAI	GPT-5	GPT Image 1	Jukebox	Point-E	Sora	
Google/ DeepMind	Gemini 2.5	Imagen	MusicLM	DreamFusion	Imagen Video	AlphaFold 3
Meta	LLaMA 2	Make-A-Scene	AudioGen	Builder Bot	Make-A-Video	ESMFold
Microsoft		NUWA-Infinity	VALL-E	NUWA-Infinity	NUWA-Infinity	BioEmu-1
Stability AI	StableLM	Stable Diffusion XL	Dance Diffusion			LibreFold
Amazon	Amazon Titan		Deep Composer			
Apple				GAUDI		
NVIDIA	MT-NLG	Edify		Edify	Edify	MegaMol BART
DeepSeek	DeepSeek-V3	Janus				
Anthropic	Claude Sonnet 4.5					
AI21 Labs	Jurassic-X					
Mistral	Mistral Large 2	Pixtral Large				
Aleph Alpha	Luminous	Luminous				

Source: Implement Economics based on Stanford University, OECD, Wired, McKinsey, CNBC, and the listed companies' official documentation.

A competitive and innovative cloud infrastructure is crucial for AI use at scale

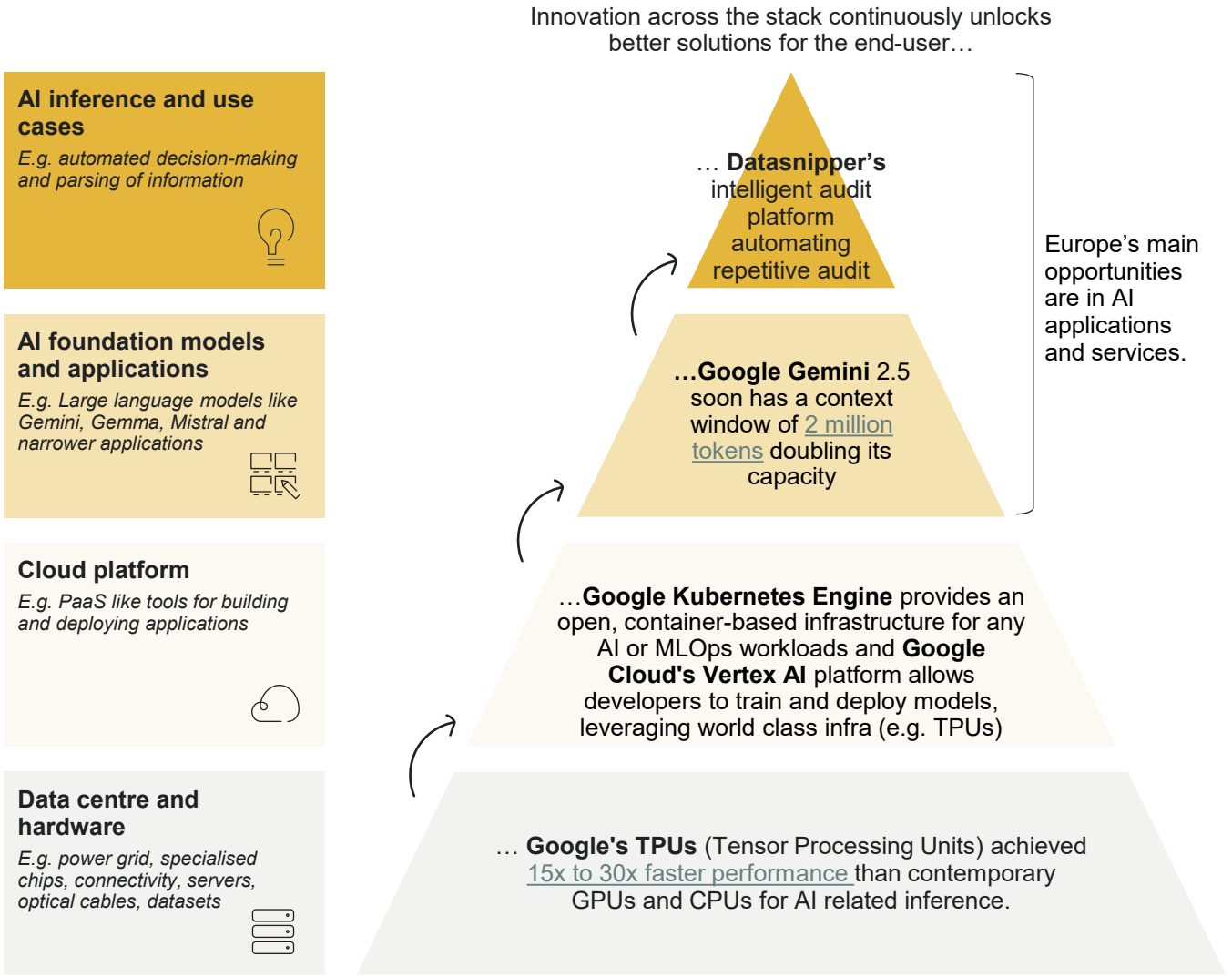
AI at scale requires a synergy between physical hardware and sophisticated software.

The potential of modern AI is unlocked through this integrated cloud infrastructure. AI models and cloud technology are fundamentally inseparable as the frontier AI solutions builds on the most recent, advanced, specialised hardware and software. Consequently, access to the full spectrum of advanced AI models depends on state-of-the-art open cloud infrastructure.

The largest AI value chain opportunities for Europe is in applications and services. Europe's industrial expertise and domain knowledge create clear opportunities to develop high-value AI solutions. An estimated 75% of the EU's growth opportunities in the AI value chain are in applications and services.

These European opportunities would best flourish if European innovators can leverage both global and European cloud and foundational model infrastructure. Constraining EU innovators to EU-only duplicates of existing models and solutions would delay and weaken these opportunities.

Scalable, adaptive, secure and capable AI relies on innovative underlying cloud infrastructure



Source: Implement Economics based Google Cloud and Datasnipper

Generative AI's EUR 1.2 trillion potential hinges on access to the globally most advanced AI models

The economic potential of generative AI grows with its capabilities: the more advanced the models and applications, the more tasks AI can complement.

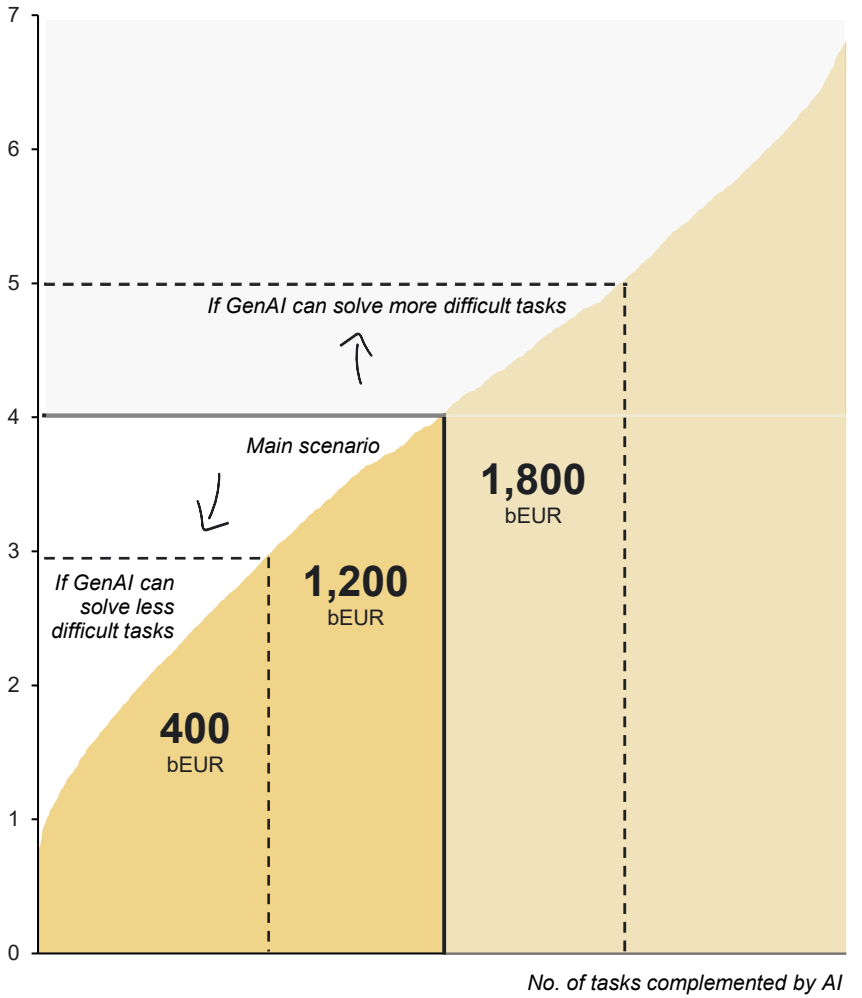
In our main scenario, AI is assumed to handle tasks up to difficulty level 4 (of 7), with an estimated economic potential of EUR 1,200 billion for the EU.

If available models in Europe can only solve tasks at level 3, the potential falls to EUR 400 billion. Conversely, if GenAI can tackle higher-level tasks, the potential would exceed our main estimate.

Realising the main scenario requires large-scale cloud and compute capacity, access to world class models, trained over global data sets, a skilled workforce and a strong application ecosystem tightly fitting local requirements.

Limited access to advanced AI solutions puts a EUR 800 billion opportunity at risk for the EU.

Tasks by difficulty level
No. of tasks



Task examples
By difficulty level

7. Collaborate with colleagues to address teaching and research issues

6. Explain economic impact of policies to the public

5. Prepare reports documenting investigation activities and results

4. Keep records of customers' charges and payments

3. Record results of diagnostic tests

2. Proofread transcripts for correct spelling of words

1. Answer customer inquiries or explain cost, availability, policies, and procedures of facilities

Note: The figure shows the distribution of all tasks in O*NET and its respective difficulty level.
Sources: Implement Economics based on Briggs & Kodnani (2024).

PART 5

Efficient cloud

- Europe needs an efficient cloud infrastructure and with continued incentive for private investment and competition

European companies benefit from choosing the cloud solutions best fit for their needs

The European cloud market is transitioning towards hybrid and multi-cloud models, with hyperscale operated data centres expected to increase from nearly half to 70% in the next five years.

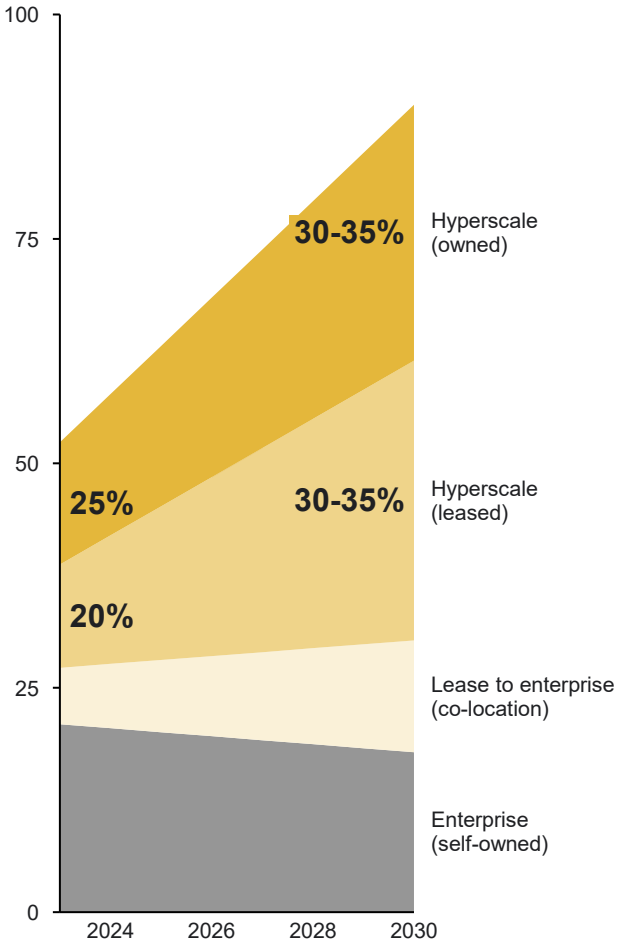
Hyperscale is preferred for its cybersecurity, scalability, cost-efficiency, and access to advanced AI and cloud solutions, as highlighted in an OECD study showing significant productivity gains from cloud.

However, some companies prioritise having data stored on-premise, demonstrating that different solutions cater to varied operational, regulatory, and financial needs.

Free choice helps European companies stay competitive because it allows them to select solutions that best match their needs, optimising their operations, reducing costs, and improving services.

40-45% of European companies prefer hyperscale cloud solutions, while 10-15% favour self-owned solutions.

Estimated EU data centre electricity consumption
TWh



The optimal choice hinges on a company's specific needs, resources, and long-term goals

The spectrum of business needs for cloud solutions
(non-exhaustive)

Cost	• Predictable upfront investment • Flexible pay-as-you-go model
Scalability and flexibility	• On-demand, near-infinite scalability to meet fluctuating demand • Maintain workload mobility across environments
Security	• World scale load balancing • Global threat intelligence
Maintenance	• Control over infrastructure configuration and updates • Focus solely on application code, outsourcing all platform maintenance
Speed	• Global deployment • Ultra-low latency for local applications

Note: Other data centres includes colocation (small to medium scale), communications service providers, internal, enterprise branches, SMB's, commercial edge and telco edge. In a data centre, installed IT capacity refers to the total rated capacity of servers, storage, and networking devices and is measured in megawatts (MW)
Sources: Implement Economics based on OECD, IEA, European Commission, Uptime intelligence, ICIS, Powerline, and Lawrence Berkeley National Laboratory

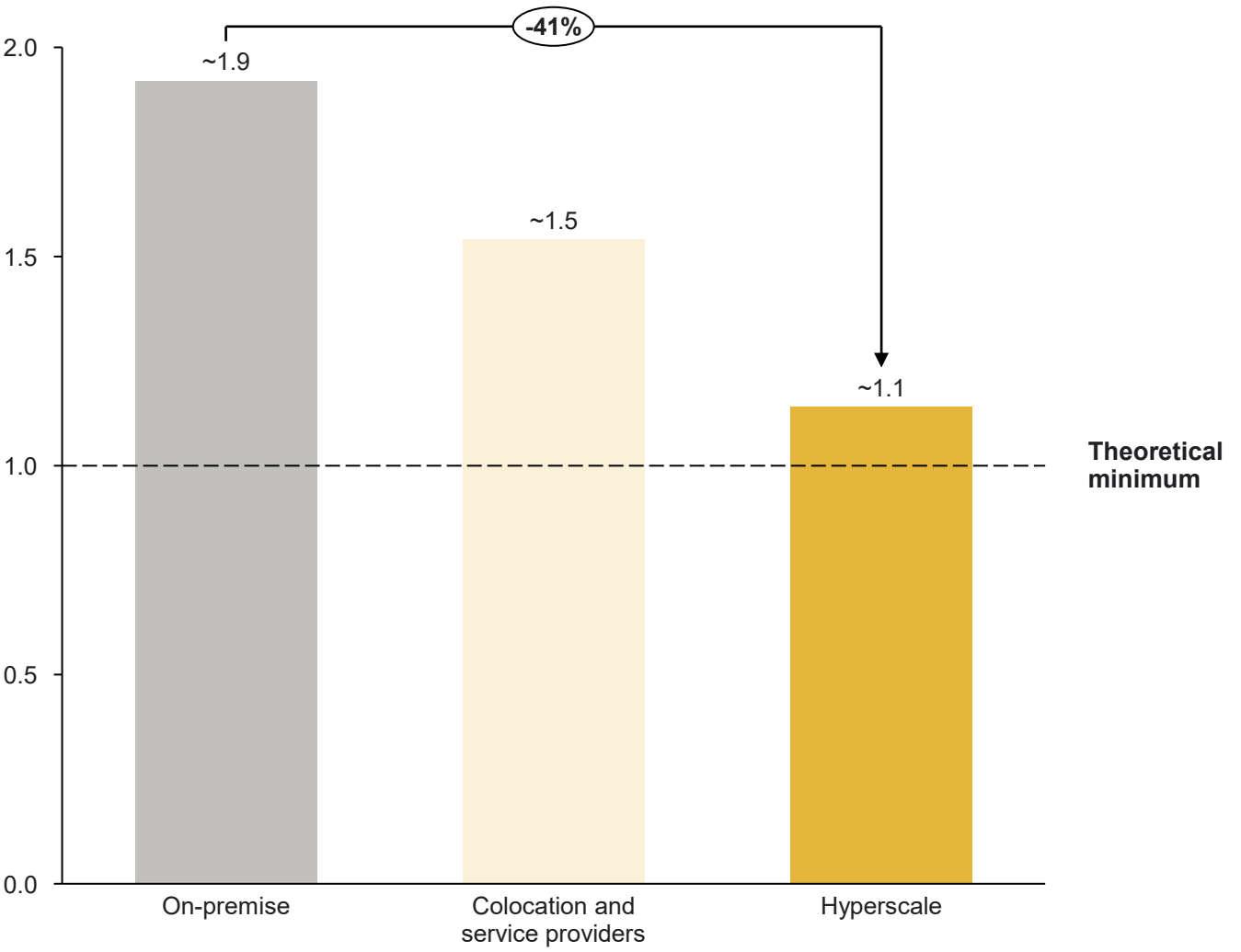
Access to a diverse cloud market is crucial for power efficiency since hyperscale solutions are 41% more efficient

Different cloud solutions, including hyperscale, colocation, and on-premises, cater to diverse needs in flexibility, scalability, speed, and maintenance.

Hyperscale data centres offer a range of efficiency advantages relative to smaller enterprise data centres including:

1. **Share of electricity used for computing**: Hyperscalers use almost 90% of power on IT-equipment versus only 53% for enterprise solutions giving them a PUE of 1.14 and 1.92 respectively globally.
2. **Output efficiency per watt:** Smaller data centres run less efficient algorithms and less sophisticated technology resulting in lower output per watt (FLOPS/watt).
3. **Utilisation:** Enterprise data centres have average utilisation rates below 20%, while hyperscale data centres with optimised loads have average utilisation rates of up to 50%.

Power usage effectiveness (PUE) globally, 2024
Factor



Note: Power Usage Effectiveness (PUE) is the ratio of the energy a data centre uses to the energy that actually goes into running the servers. A number of 1 means that all the power goes to running the servers.
Sources: Implement Economics based on IEA.

Ensuring an efficient cloud market can reduce power consumption by 8%

As hyperscale data centres are more energy efficient than other types of data centres, continued expansion of hyperscalers in Europe towards 2030 is important for the overall energy efficiency of the data centre expansion.

The IEA projects that hyperscalers will make up a large share of the cloud expansion in Europe towards 2030.

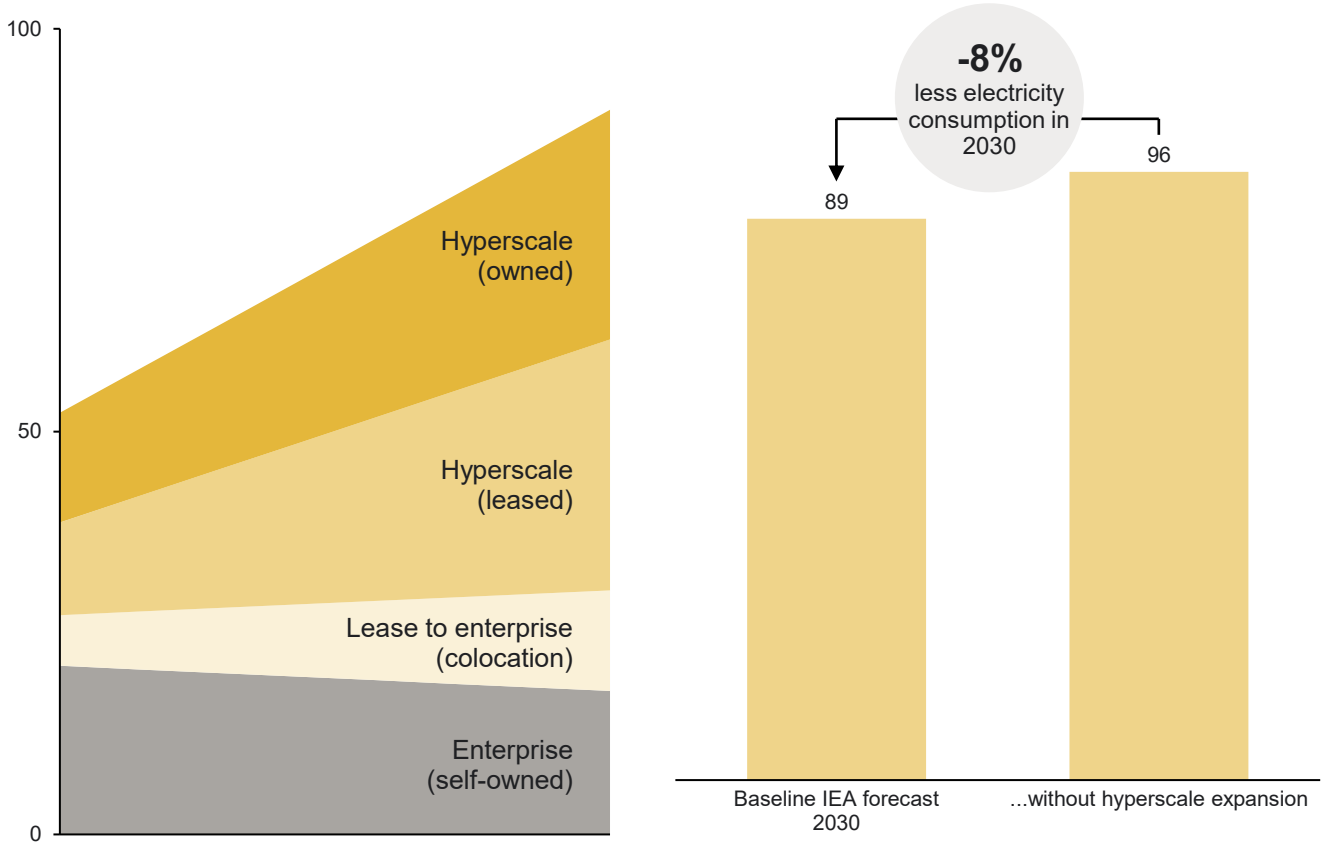
If the European demand for compute capacity would be met without the forecasted expansion of hyperscalers, this would require more energy.

The expansion of hyperscalers can reduce data centre power consumption in Europe by 8% compared to a scenario where the demand for compute is met without expanding the hyperscale segment.

Beyond these energy considerations, restricting choice would entail significant costs as businesses will miss out on state-of-the-art cloud solutions. EuroStack aims to build "*a complete digital ecosystem made and supplied in Europe*".

Scenarios for the European cloud market in 2030

Estimated EU data centre electricity consumption
TWh



Freedom of choice supporting an efficient market	☑	☒
Hyperscale capacity share	**65%**	**17%**

Note: Other data centres includes colocation (small to medium scale), communications service providers, internal, enterprise branches, SMB's, commercial edge and telco edge. The calculation assumes that hyperscale operated data centres regardless of ownerships have similar PUE. The calculation based on forecasted global PUE improvements towards 2030 by IEA. Installed IT capacity is defined by the IEA as the total rated capacity of servers, storage, and networking devices and is measured in megawatts (MW).
Sources: Implement Economics based on European Commission, Uptime intelligence, ICIS, Powerline, and Lawrence Berkeley National Laboratory.

PART 6

Clean cloud

- Cloud can be sustainable and clean if the best players are allowed to operate in the European market.

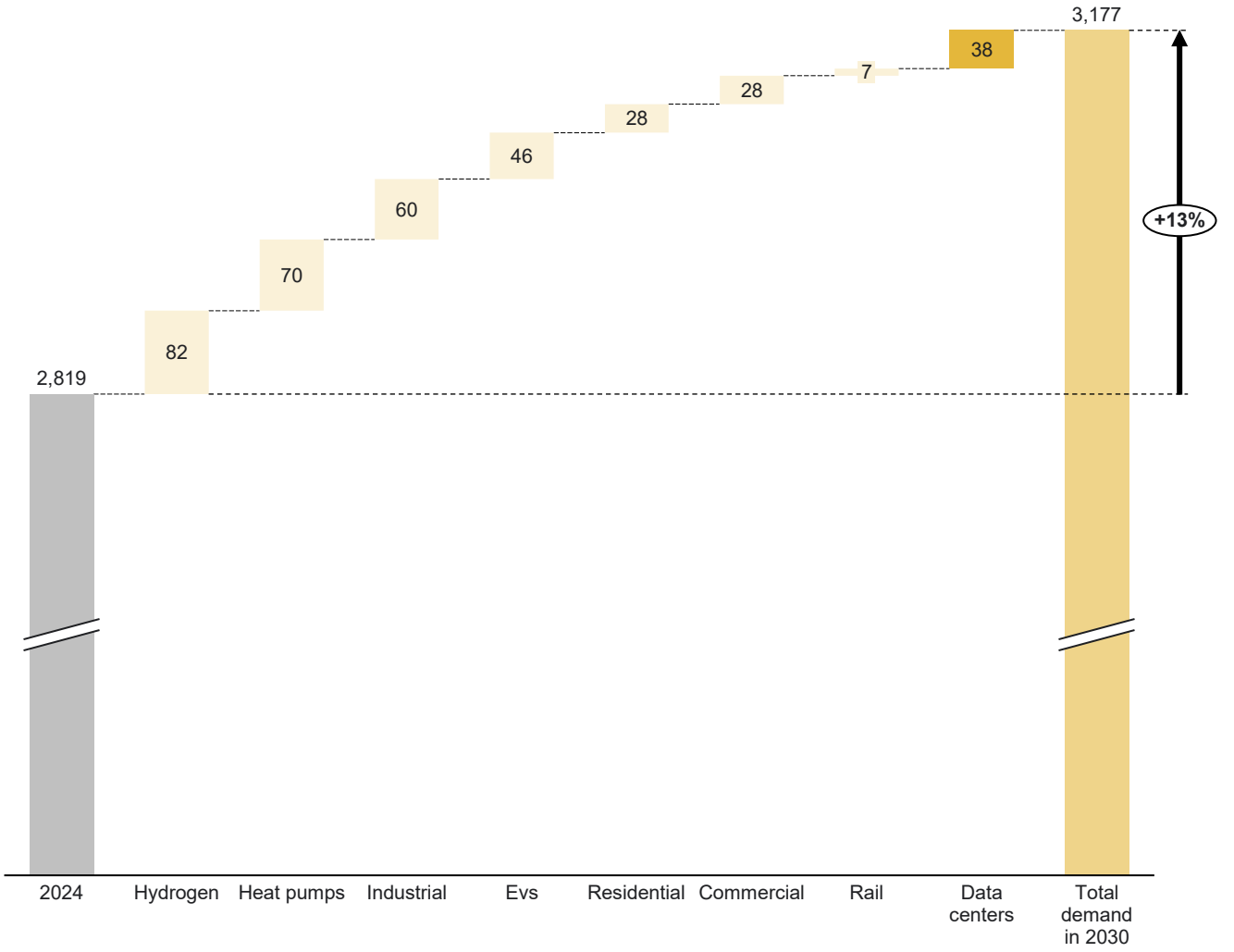
Cloud infrastructure requires large amounts of energy

Data centres require vast amounts of energy and with the need for more data centres, they are expected to consume more going forward.

In 2023, data centres in the EU consumed an estimated 52TWh accounting for 1-2% of EU's electricity consumption. Towards 2030, EU data centres' power consumption is expected to increase by 89 TWh. The increased growth in data centres' power consumption is driven by growth in global IP traffic, mobile subscription and social media accounts, but has been partially offset by large increases in data centre efficiency.

Growth in power consumption of data centres' follow the electrification trend of the overall economy, where electricity consumption in Europe is expected to grow by around 350TWh or 13% by 2030 and could double by 2050 according to RepowerEU. Data centre electricity demand growth accounts for around 10% of electricity demand growth towards 2030, while playing a central role in the electrification in other sectors like transport.

Estimated increase in EU electricity consumption, 2024-2030
TWh



Sources: Implement Economics IDIC, Eurostat and IEA

Large cloud operators are increasingly investing in and using carbon-free energy and aim to be 100% 24/7 carbon-free by 2030

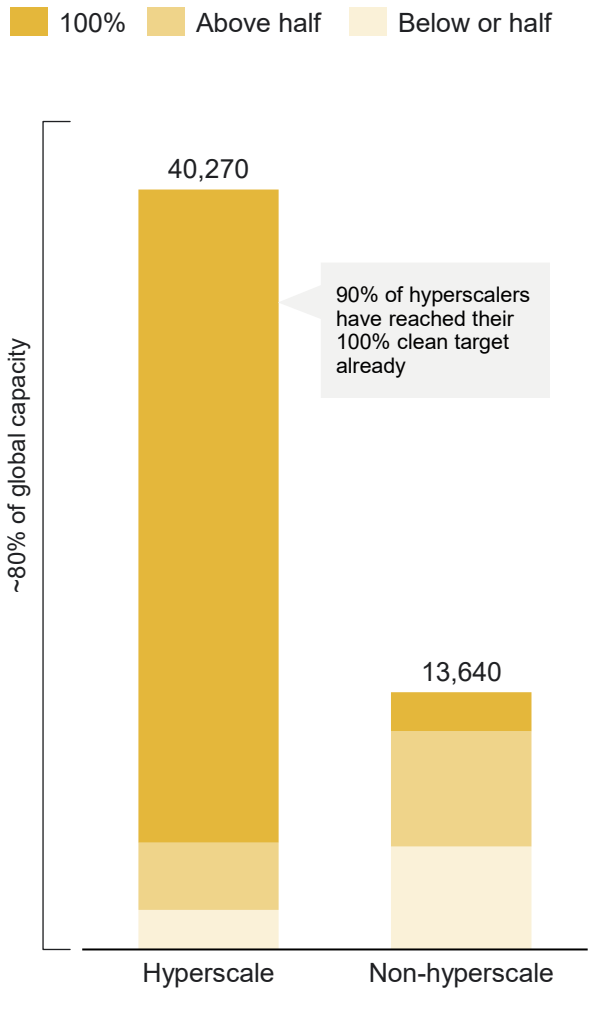
Many technology companies and large data centre operators have set ambitious goals for reducing emissions and procuring clean energy. 54% of world-wide data centre capacity is already operating with a 100% renewable energy share.

To enhance their sustainability strategies and further support decarbonised grids where they operate, some technology companies are concluding PPAs with hourly matching. This means that some or all of their electricity consumption is matched hour-by-hour by a portfolio of renewable energy and storage assets, or other types of low-emissions power generators located in the same region. For instance, Google seeks to achieve hourly matching, and Microsoft has signed hourly PPAs in support of its goal to be carbon negative by 2030.

In Europe, renewables and nuclear are set to supply most of the additional electricity required, with their combined share rising to 85% by 2030.

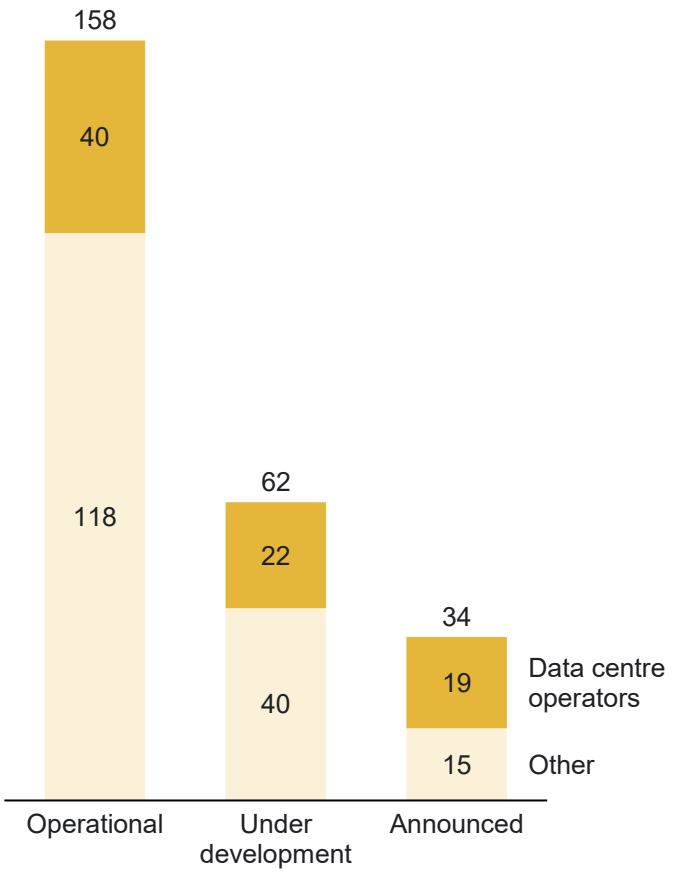
Data centre providers – especially the largest ones - are committing to carbon-free energy…

Operators' share of clean target realised
Estimated DC capacity (MW)



… and are heavily investing in the buildout of renewable energy production

Global renewables PPA capacity, 2025
GW



Note: Data centre operators' renewable energy shares are ranked on their total estimated data centre capacity as of the end of the first half of 2024 based on OMIDA (2025). PPA=Power Purchase Agreement.
Source: Implement Economics based on IEA and OMIDA

Hyperscale investments in renewable energy reduce emissions from data centre electricity consumption

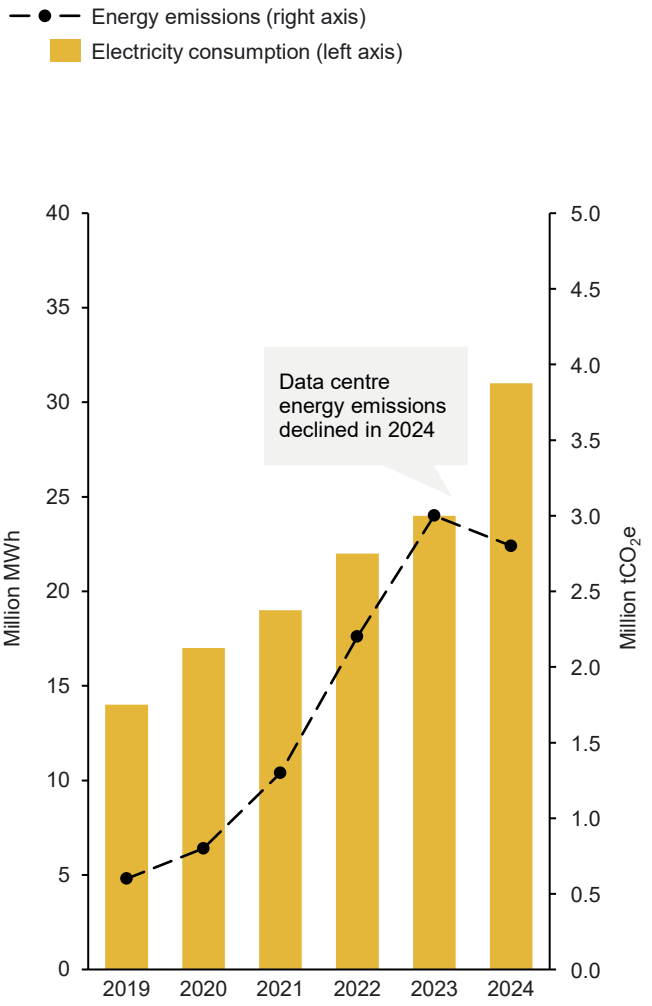
In 2024, Google reduced its global data centre energy emissions by 12% compared to 2023. This reduction was achieved despite a 27% increase in global data centre electricity consumption due to growing demand for cloud services, including AI.

This is a result of many years of investment in clean energy procurement. Google is one of the largest corporate purchasers of clean energy, and from 2010 to 2024, the company signed more than 170 agreements to purchase over 22 GW of clean energy generation, similar to Portugal's total renewable energy in 2024. These purchases include agreements for over 4.5 GW in Europe.

In 2024, Google achieved approximately 66% global average carbon-free energy across their data centres and offices, whereas the European average was 84%. Four of Google's European grid regions operate at more than 80% carbon-free energy (CFE).

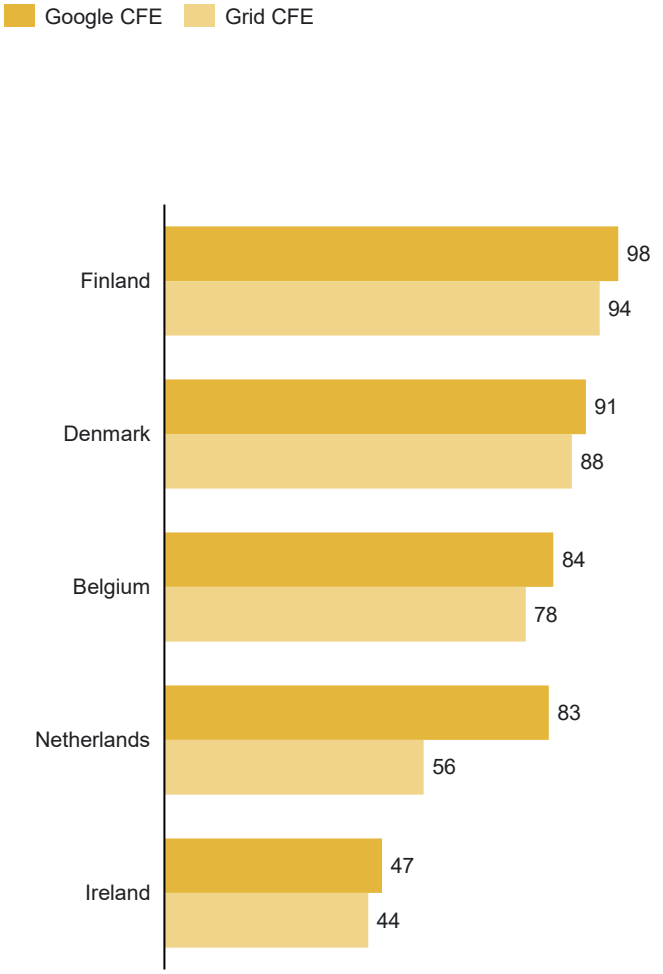
Google succeeded in decreasing their data centre emissions last year…

Trajectory of data centre electricity consumption and data centre energy emissions



…and the share of carbon-free energy is higher than the average in the grid.

Data centre and grid region carbon-free energy
CFE percentage



Note: **Google CFE** is calculated as a percentage that measures the degree to which Google's electricity consumption on a given regional grid is matched with CFE on an hourly basis. This is calculated using both CFE under contract by Google (Contracted CFE) as well as CFE coming from the overall grid mix (Grid CFE). Grid CFE refers to the percentage of carbon-free energy sources consumed within a Regional Grid. Grid CFE is applied to Google's load for any hour where Google's Contracted CFE is less than the load. Grid CFE values are calculated by a third-party, Electricity Maps. 2023 is the first year Google is disclosing CFE across Google data centres.
Sources: Implement Economics based on Google Environmental Reports 2024 and 2025.

PART 7

Cloud clarity

- Europe urgently needs to create a clear and coherent cloud policy to speed up private investment in a smart EuroStack

Innovation, not isolation, is the path to European digital sovereignty

Innovation with control

Europe needs a running start on *smart stack* that combines the best of European innovation with world-leading technologies.

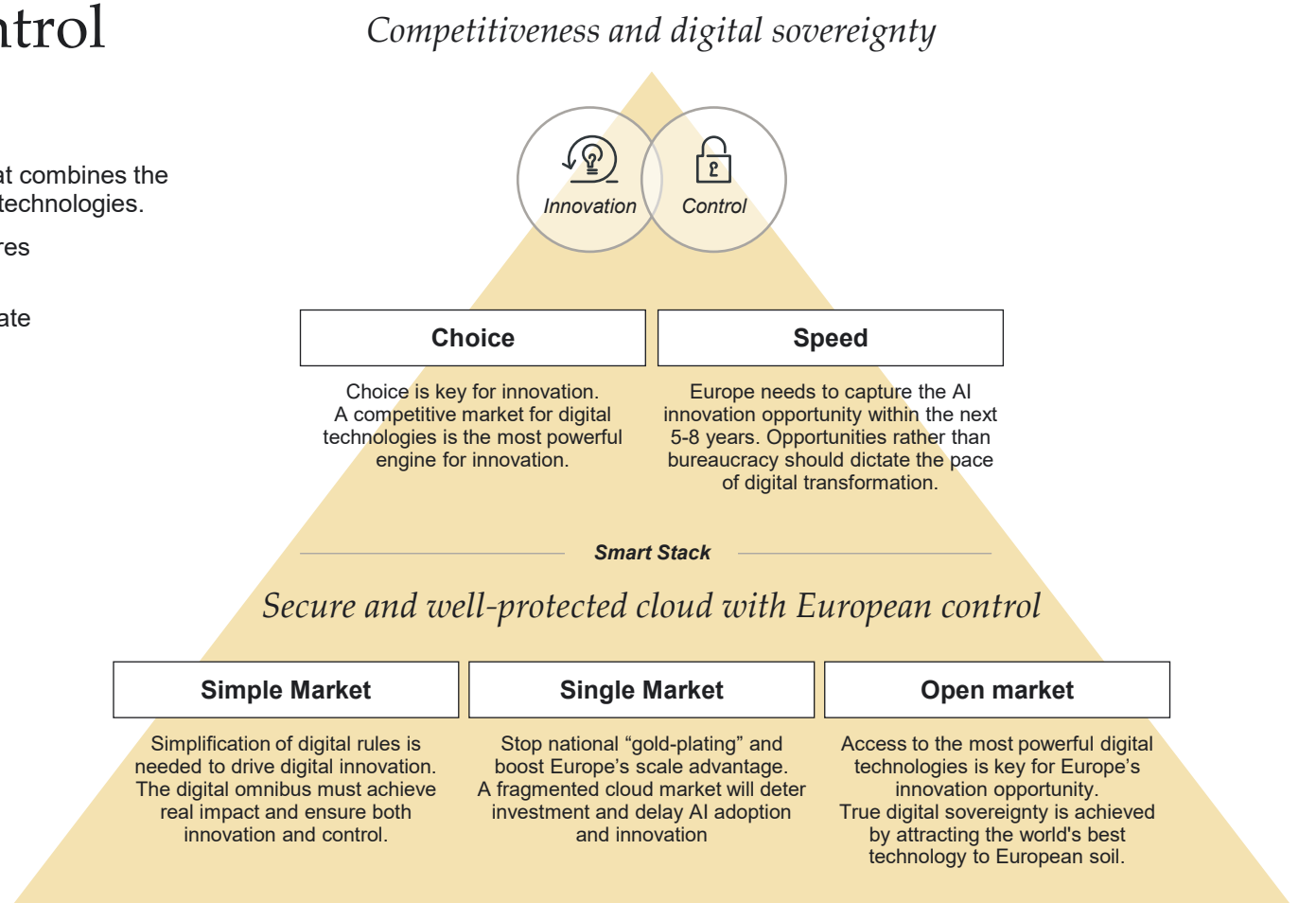
Building a *smart stack* at scale and speed requires a EUR 400 billion investment before 2030.

To drive that investment which is key to accelerate Europe's AI opportunities, innovators and investors need clarity on Europe's AI and cloud policies.

Secure and well-protected cloud with European control is at the heart of the *smart stack.*

The key objectives of the policies to support this should be *choice* and *speed.*

The main policy lever is that the European Union once again **is a simple, single and open market for digital technologies.**



Authors

- Bodil Emilie Hovmand
- Anders Thor Lundberg
- Sissel Andersen
- Martin H. Thelle

Disclaimer

This report (the “Report”) has been prepared by Implement Consulting Group (Implement). The purpose of this Report is to analyse a framework for an EU-wide expansion of cloud infrastructure to drive European competitiveness. All information in the Report is derived from or estimated by Implement’s analysis using proprietary and publicly available information. Google (“The Company”) has not supplied any company data, nor does it endorse any estimates made in the Report. In addition to the primary market research and publicly available data, Implement’s analysis is based on third-party data provided by the Company. In preparing the Report, Implement has, without independent verification, relied on the accuracy of information made available by the Company. Where information has been obtained from third-party sources and proprietary research, this is clearly referenced in the footnotes. The Report is based on work conducted in 2025. Implement will not make any representation or warranty as to the correctness, accuracy or completeness of the contents of the Report or as to the sufficiency and/or suitability thereof for the Company’s or the reader’s purposes, nor does Implement assume any liability to the Company, the reader or any other legal entities for any losses or damages resulting from the use of any part of the information in the Report. The information contained herein is subject to change, completion or amendment without notice. In furnishing the Report, Implement undertakes no obligation to provide the Company with access to any additional information.