Copenhagen Economics

ASSESSMENT OF SOCIO-ECONOMIC BENEFITS OF THE DATA CENTRE SECTOR IN PORTUGAL

CLIENT: START CAMPUS
15 APRIL 2025

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SOCIO-ECONOMIC BENEFITS OF DATA CENTRE SECTOR IN PORTUGAL

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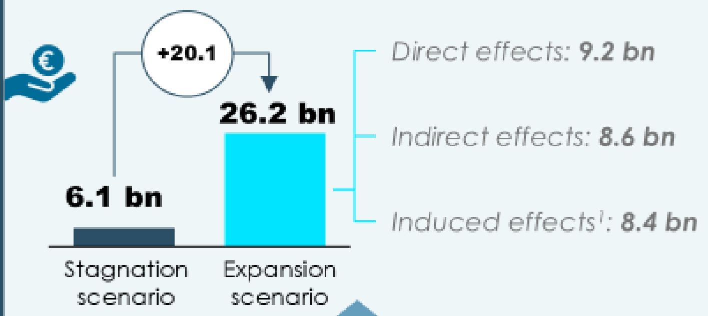
THE DATA CENTRE SECTOR IN PORTUGAL IS GROWING, WITH THE POTENTIAL TO SUPPORT SUBSTANTIAL GDP CONTRIBUTIONS AND JOBS

Up to **+EUR 26.2 bn in total GDP contribution between 2025-2030**

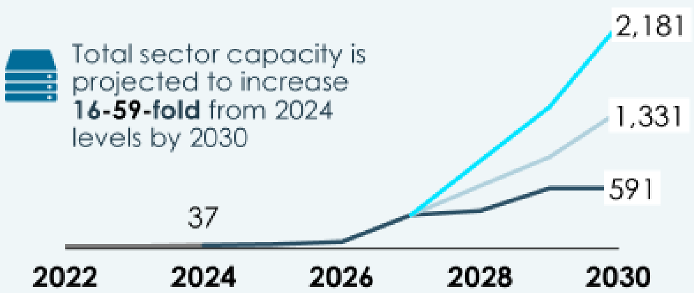
Up to **+48,400 jobs supported** (full-time per year, across the economy)

Estimated total GDP contribution 2025-2030



A SUBSTANTIAL PART OF POTENTIAL GDP CONTRIBUTIONS WILL DEPEND ON THE SECTOR'S GROWTH TRAJECTORY

Projected sector capacity (MW)



THE SECTOR CAN TAKE DIFFERENT GROWTH TRAJECTORIES DEPENDING ON INVESTMENT CONDITIONS

THE DATA CENTRE SECTOR SUPPORTS DIGITAL TRANSFORMATION ACROSS THE ECONOMY, AND FOSTERS BROADER SOCIO-ECONOMIC BENEFITS

Globally, data centres support digital transformation, including the development and adoption of advanced cloud and AI solutions

Enabling innovation
Supports research across sectors and the development of new products/services

Significant productivity gains
Helps businesses achieve more without the need for more resources, supporting growth

Increased AI adoption can drive a substantial increase in annual GDP in Portugal over the next 10 years.

Broader socio-economic benefits, based on interviews with a wide stakeholder group

Retains skilled talent in Portugal and attracts further talent from abroad

Data centres "contribute significantly to regional development and help retain local youth by providing job opportunities and attracting new, highly qualified talent to the region, which helps combat population decline and further supports local economic growth"

Creates new education opportunities to develop skilled workforce in high-tech industries

"In our school we have partnerships with data centre operators that help us adapt existing curricula and develop new programs tailored to the sector's needs"

Fosters social/territorial cohesion through regional development and support to communities

"Data centres help improve social and territorial cohesion by expanding broadband coverage, reducing digital inequalities, and contributing to providing access to healthcare, education, and public services in all regions, including rural areas."

1) Induced effects arise from employees at data centres and supplier industries spending wages throughout the economy. These effects are less clearly attributable to the sector itself than other effects.

SOCIO-ECONOMIC BENEFITS OF DATA CENTRE SECTOR IN PORTUGAL

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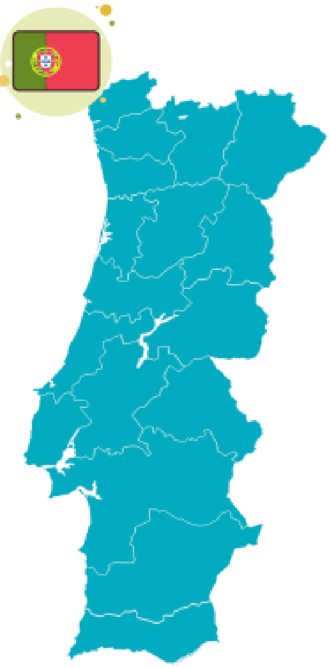
PORTUGAL HAS FAVOURABLE CONDITIONS FOR DATA CENTRE DEVELOPMENT



1 **A strategic location and robust connectivity**

- Subsea cables: Portugal hosts 25 per cent of global subsea cables.
- Location and connectivity enable competitive latency to many regions.
- High coverage of fibre networks: 92 per cent of households covered.

2 **Comparatively low energy prices**

- Portugal has one of the lowest non-household electricity prices in the EU.
- Average prices in Portugal were 30 per cent lower than the EU average in 2024.

3 **Access to renewable energy and water cooling solutions**

- Large supply of renewable energy: In 2024, 87.5 per cent of net electricity generation in Portugal was from renewables (the second highest in the EU).
- Access to the Atlantic enables efficient data centre water cooling solutions.

4 **Access to skilled professionals**

- 28 per cent of university graduates are pursuing computer science or engineering.
- Nearly 230,000 ICT specialists, comprising 4.5 per cent of the workforce.

POLICY CONDITIONS WILL SHAPE THE LEVEL OF FUTURE INVESTMENTS

Policy conditions can contribute to (i) **addressing challenges that could block or delay investment** and (ii) supporting the data centre sector in **realising its full potential**

5 Key areas
Policymakers may consider to help the sector reach its full potential

- Protect against restrictions on the trade of advanced technologies, such as semiconductor chips
- Streamline permitting and other regulatory processes (construction, subsea cables, fibre)
- Ensure continued access to the electricity grid
- Develop measures aimed at supporting investments in the data centre sector
- Stimulate the adoption of digital tools across businesses, government and consumers

Portugal's **AI** and **digital strategies** do not currently have any measures specifically focused on data centres.

Policymakers may draw inspiration from other countries with dedicated policies to support data centres.

The UK, France and Spain include **measures focused on data centres** in their AI strategies

- *Streamlined permitting processes;*
- *Designating areas for data centre investments, considering key input availability (e.g., grid access);*
- *Financial incentives.*

EXECUTIVE SUMMARY

Data centres are critical components of the digital economy (Chapter 1).
Data centres are hubs that store, manage, and process the massive amounts of data needed to power everything from online banking and healthcare systems to streaming, shopping, and artificial intelligence (AI). Data centres are crucial for digital transformation, providing the computational capacity and connectivity needed for advanced digital solutions, enabling the benefits that such technologies offer. Simply put, they keep the internet running smoothly, ensuring that people, businesses and governments can access the digital services we rely on every day.

AI is triggering a surge in demand for data centres (Chapter 2).
AI can deliver significant economic gains inter alia by supporting innovation and by boosting productivity across almost all sectors. Research suggests that widespread AI adoption could drive a 7 per cent increase in GDP over the next 10 years, with perhaps even greater potential in economies with a favourable industry composition, such as Portugal. However, AI requires extensive computational capacity, which is often provided by data centres. The increase in demand for computing capacity for AI has been estimated to grow by as much as 33 per cent annually between 2023 and 2030. By 2030, it is estimated that around 70 per cent of total demand for computing capacity will be for data centres equipped to host advanced AI workloads. Apart from AI, the expansion of cloud computing and other digital services is also expected to drive increased demand for data centres.

Until now, little evidence has been available on the socio-economic contribution of the data centre sector in Portugal.
Although data centres play a key role in the digital economy, few existing studies have explored this sector in Portugal. Against this background, Start Campus asked Copenhagen Economics to conduct an independent research study to (i) describe how data centres fit into the digital economy, and (ii) assess the current and future potential socio-economic contributions of the entire data centre sector in Portugal. We note that the focus of this study is on the contributions of the data centre sector, rather than assessing the net impacts, weighing benefits against any potential drawbacks.

Portugal has favourable conditions for data centre development (Chapter 3).
We find that Portugal is well-positioned to become a key hub for data centres in Europe. First, its strategic location and robust connectivity infrastructure enable competitive latency to important European and global economic centres. Portugal is a hub for subsea cable connectivity, estimated to host 25 per cent of global subsea cables, and ranks third in the EU for fibre network coverage at 92 per cent of premises. Second, has comparatively low electricity prices that are 30 per cent below the EU average, an important cost advantage for data centres, where electricity is a major expense. Third, the country provides access to (i) a large supply of electricity from renewables, with 87.5 per cent of total net generation coming from renewables; and (ii) seawater that enables more energy-efficient cooling solutions. Fourth, Portugal provides access to a pool of skilled professionals that is perceived by stakeholders as highly skilled.

The data centre sector has the potential to contribute up to EUR 26.2 billion to the Portuguese economy between 2025-2030 (Chapters 4 and 5).
Based on a macroeconomic model, we find that the sector supports substantial economic activity. Between 2022-2024, the data centre sector contributed a total of EUR 311 million to Portugal's GDP

and supported 1,700 jobs annually, when considering direct, indirect, and induced effects. The sector's GDP contribution is expected to grow significantly between 2025 and 2030, but the benefits will depend on the growth trajectory influenced by investment conditions. Under favourable investment conditions, the sector is expected to contribute up to EUR 26.2 billion to GDP between 2025-2030, equivalent to 1.3 per cent of GDP per citizen, and supporting 48,400 jobs annually, including direct (3,045 jobs), indirect (24,143 jobs) and induced (21,213 jobs) effects.

The growth of the data centre sector has additional economic impacts beyond those we quantify in our model (Chapter 4).
We find that the sector supports additional economic impacts that our model does not account for, such as (i) enabling digital technologies like AI and cloud, which drive innovation and productivity and which analysis suggests could increase GDP by more than 7 per cent annually, (ii) strengthening the growth of the start-up ecosystem, (iii) fostering the competitiveness of suppliers, (iv) sparking synergies which can lead to additional infrastructure investments (e.g., in subsea cables) and (v) attracting substantial FDI across sectors in the supply chain. These factors enhance GDP and competitiveness and may foster clusters within the digital infrastructure value chain, drawing further investments to Portugal. Additionally, data centres can support the digital transition in other countries, allowing Portugal to leverage its digital infrastructure to export computing power.

Data centres can foster broader socio-economic benefits (Chapter 5).
Based on interviews with key stakeholders, we find that, beyond the substantial number of jobs supported, the sector fosters broader social benefits, stimulates local economies, and enhances the competitiveness of local businesses. The job opportunities created by data centre investments, including in the supply ecosystem, contribute to attracting and retaining skilled workers in Portugal. Data centre investments can also promote regional development by attracting businesses to less densely populated areas, mitigating depopulation, and strengthening social and territorial cohesion. Additionally, data centre investments can foster the development of new education programs and opportunities, further supporting the retention of residents and territorial and social cohesion.

Policy conditions will shape future investments and the corresponding economic benefits to GDP and employment (Chapter 6).
We find that, to support the data centre sector in realising its full potential, policymakers may consider five areas: (i) ensuring access to advanced technologies, particularly semiconductor chips, is crucial to prevent trade restrictions from hindering sector development; (ii) streamlining permitting and regulatory processes applicable to data centres, subsea cables and civil infrastructure to support fibre networks; (iii) ensuring continued access to the electricity grid and fostering transparency and predictability in energy supply expansion (iv) developing targeted measures for data centre investments, such as designated data centre zones or financial support; and (v) stimulating broader adoption of digital tools by businesses, the government and citizens adoption of digital tools. Policies in the UK, Spain, and France may provide valuable examples of measures to foster data centre investments that could enhance Portugal's attractiveness and contribute to maximise the sector's economic contribution to employment and GDP.

Structure of our report

Our report is structured as follows:

- In **Chapter 1**, we describe the basics of data centres and their role in the broader digital landscape.
- In **Chapter 2**, we describe how AI is expected to drive significant economic growth in Portugal and how its development and use rely on robust connectivity infrastructure, particularly data centres.
- In **Chapter 3**, we provide an overview of various characteristics that make Portugal an especially attractive destination for data centre infrastructure.
- In **Chapter 4**, we estimate the economic contribution supported by the construction and operations of data centres to the Portuguese economy between 2022 and 2024, and the expected contribution until 2030 in different future scenarios.
- In **Chapter 5**, we describe the broader socio-economic benefits of data centre investments, including job creation, economic growth, territorial cohesion, and talent retention.
- In **Chapter 6**, we discuss how policymakers can support continued investment while achieving other policy objectives to ensure that future benefits materialise.

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METHODOLOGY

Our study's methodology combines three main elements: (i) in-depth research of studies and publicly available statistics, (ii) a macroeconomic model called an "Input-Output (IO) model", and (iii) interviews with stakeholders of the data centre sector in Portugal.

We have conducted extensive desk research to describe and assess the dynamics affecting the data centre sector, its economic effects, key trends and more broadly the digital ecosystem. Our sources include public institutions (European Commission, Eurostat), international organisations (e.g., International Energy Agency and OECD), private consulting or intelligence firms (e.g., International Data Corporation, McKinsey & Company), and academic researchers.

We have used a macroeconomic IO model to estimate the economic contribution of the data centre sector to GDP and employment in Portugal. The IO model is a well-established economic tool used to evaluate how sectors contribute to the broader economy, accounting for the macroeconomic linkages between sectors.

Using data from Eurostat and OECD, we calibrated our model to capture specific linkages between economic activities in the Portuguese economy and relied on three other core inputs: (i) the overall capacity of the data centre sector; (ii) the expenditure of data centre operators in the construction and operation of data centres; (iii) information on how the expenditure is spread across different economic activities of suppliers. This information was retrieved from a combination of sources, including international cost benchmarks, Start Campus' financial information and sector stakeholders' insights.

This study has benefited from the insights gathered in interviews with stakeholders across several sectors. We conducted interviews with the following stakeholders: the Portuguese Trade and Investment Agency (AICEP), National Communications Authority (ANACOM); Foundation for National Scientific Computation (FCNN/FCT); Portuguese National Innovation Agency (ANI); Altice Portugal; NOS Comunicações (NOS); Equinix; CTS Group; Jacobs Solutions Inc.; CBRE; Câmara Municipal de Sines, Escola Tecnológica do Litoral Alentejano (ETLA); Professor Doutor Arlindo Oliveira; A relevant energy company active in Portugal; and, a relevant international tech company active in Portugal.

Copenhagen Economics invited stakeholders in writing between February 12-15, outlining the study's purpose and key topics. Interviews were held via Microsoft Teams between 20 February 2025 and 26 March 2025, lasting a median of 30 minutes. A semi-structured approach combined pre-prepared questions with open-ended discussion.[1] All named stakeholders were informed of and accepted the transcription of their contributions reproduced in this report.

CHAPTER 1

DATA CENTRES ARE CRUCIAL TO THE DIGITAL ECONOMY

Key insights

- Data centres are hubs that **store, manage, process, and distribute data to users**, businesses, and digital applications worldwide.
- Data centres are **essential in the digital ecosystem, supporting virtually all digital services** used by businesses, consumers and governments.
- Data centres **power the technologies driving today's digital transformation**. Cloud computing, cloud services, AI, and advanced IT services, all rely on the vast computational capacity and high-speed connectivity data centres provide.
- The setup of data centres can vary based on their target customers and use cases. While on-premises or enterprise data centres are designed with a single company-specific use case in mind, **large-scale data centres such as hyperscale and colocation data centres operate on larger scales and can service multiple clients at once**.

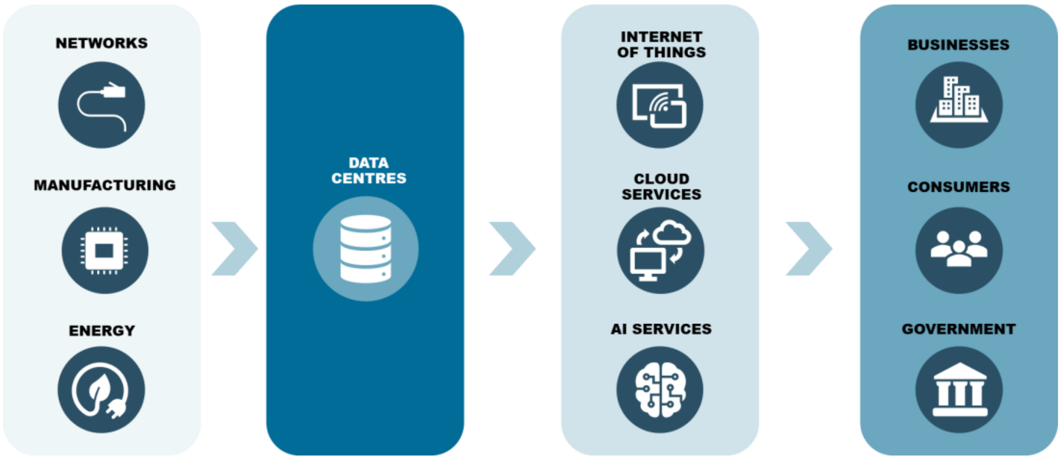
In this chapter, we describe the structure and functioning of data centres and examine their role in the broader digital landscape, particularly in driving the AI transformation. The chapter is structured as follows:

- In **section 1.1**, we discuss the fundamental role of data centres in the digital ecosystem and value chain, underlining their growing importance.
- In **section 1.2**, we briefly describe key data centre infrastructure and their supporting systems and provide a brief overview of the distinct types of data centres and their specific use cases.

1.1 DATA CENTRES PLAY A CENTRAL ROLE IN THE DIGITAL ECOSYSTEM

Data centres are vital to the digital ecosystem, providing essential infrastructure for data storage, processing, and management. The emergence of data centres has brought about a fundamental shift in how firms access digital technologies. They support key digital services and technologies like cloud computing and AI. Data centres enable seamless connectivity and real-time data handling, driving the use of digital solution across various user groups, see Figure **1**.

Figure 1
Data centres play a crucial role in the value chain of the digital ecosystem



Source: Copenhagen Economics

Beyond data storage and delivery, data centres power the technologies driving today's digital transformation. Cloud computing, cloud services, AI, and advanced IT services, all rely on the vast computational capacity and high-speed connectivity data centres provide. These technologies — essential for automating processes, analysing data, and delivering scalable digital solutions — are only possible because data centres process information efficiently in real-time and ensure uninterrupted service.

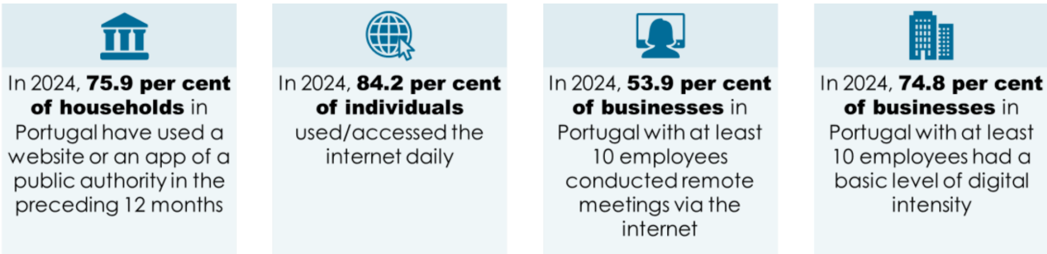
> Data centres are crucial for creating a secure, interconnected, and efficient digital ecosystem, attracting foreign investment, supporting innovation and promoting the development and testing of new technologies and business models

Source: President of the Board, ANACOM

Further along the value chain, businesses and consumers benefit directly from the services made possible by data centres. Businesses leverage cloud platforms for agility and innovation, use AI to enhance decision-making, and rely on IT systems for day-to-day operations — all of which are supported by data centres working behind the scenes. For consumers, seamless access to streaming, social media, online shopping, and digital services depends on the infrastructure that data centres provide, ensuring fast, reliable, and personalised experiences.

Digital infrastructure, including data centres, underpins all the digital services used by consumers and businesses. Statistics on internet and digital technology usage by businesses and households in Portugal illustrate the critical role of digital infrastructure and the reliance of modern society on these services, see Figure **2**.

Figure 2
A high share of businesses and households in Portugal rely on the internet and digital services for multiple uses



Source: Eurostat[2,3,4,5]

The increasing adoption of digital services underlines the fundamental role of data centres in the digital ecosystem. Two particular trends drive the increased importance of data centres: (i) cloud computing adoption and (ii) artificial intelligence development and use.

Cloud computing

Cloud services have become commonplace in today's society, providing vital infrastructure which supports improved innovation, productivity and scaling for most businesses and organisations.[6,7] Businesses, governments, and organisations have been steadily migrating from on-premises data storage to cloud-based solutions over the past decade.[8] In 2025, cloud end-user spending on public cloud services is forecast to achieve a 21.5 per cent annual market growth rate worldwide.[9]

Businesses rely on cloud services to develop, deploy, and manage their operations — all made possible by data centres. As demand for cloud services grows, businesses, consumers, and service providers become more reliant on data centres to keep these services running reliably.[10]

2 Eurostat (2024), E-government activities of individuals via websites, online data code isoc_ciegi_ac, Available here.
3 Eurostat (2024), Individuals - frequency of internet use, online data code isoc_ci_ifp_fu, Available here.
4 Eurostat (2025), Meetings via the internet by size class of enterprise, online data code isoc_ci_mvis, Available here.
5 Eurostat (2025), Digital Intensity by size class of enterprise, online data code: isoc_e_dii, Available here.
6 CMA (2025), CMA independent inquiry group publishes provisional findings in cloud services market investigation, Available here. (Accessed: 17 March 2025)
7 E.g., in Norway, data centres have been found to contribute twice as much to value creation in comparison to traditional power-intensive industries measured in relation to power consumed, Available here.
8 See e.g., Andrade, R.M.C. et al. (2025). Migration from On-Premises to Cloud: Challenges and Opportunities. In: Florez, H., Astudillo, H. (eds) Applied Informatics. ICAI 2024. Communications in Computer and Information Science, vol 2236. Springer, Cham.
9 Gartner (2024), Gartner Forecasts Worldwide Public Cloud End-User Spending to Total $723 Billion in 2025, Available here.
10 Canalys (2025): Worldwide cloud service spending to grow by 19% in 2025, Available here.

Apart from the main business use cases outlined above, the evolution of data centre infrastructure is also noticeable from the perspective of a private consumer in multiple ways. Streaming services Netflix or Spotify, base their product offering on their usage of cloud services and data centres.[11] Many different internet features such as search engines and web hosting are also to a large extent based on data centres.[12]

Data centres are crucial for public services and government agencies, ensuring the reliability, security, and efficiency of systems like healthcare records, tax services, and digital infrastructure. They provide the computing power and storage needed for advanced programs that support decision-making and improve citizen services.[13] Recognised as critical national infrastructure in the UK, data centres also protect sensitive information and ensure resilience against cyber threats. As governments continue to digitise, data centres will remain essential to delivering efficient, secure, and innovative public services.

Artificial Intelligence
The development and adoption of AI is increasing the importance of data centres for two main reasons:

- *First*, AI is accelerating the rhythm at which businesses migrate to cloud services. As cloud services integrate AI solutions, offers become increasingly attractive for businesses, thus prompting migration to cloud services.[14][15]
- *Second*, AI solutions often require significantly more computing power compared with more traditional digital services, which is driving a transformation of data centres. Data centres are increasingly designed to meet the specifications of AI workloads, further strengthening their role as critical enablers of transformation in the digital ecosystem. We explore in more detail how data centres underpin advancements in AI in section 2.2 below.

1.2 DATA CENTRES HOUSE COMPUTER SYSTEMS AND RELATED COMPONENTS

Data centres house the IT infrastructure needed for storing, managing, processing, and distributing data, such as computing machines and related hardware, that supports the development and use of digital applications and services.[16]

Data centres broadly consist of three categories of infrastructure: (i) computing; (ii) storage; and (iii) network infrastructure – see Box **1**.

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11 Amazon Web Services (2016): Netflix Case Study, Available here.
12 Data Centre Magazine (2024): Top 10 Data Centre Uses, Available here.
13 CDW (2023): How Data Centre Optimization Helps State and Local Agencies Improve Services, Available here; StateTech (2023): State and Local Governments Strengthen Services Through Data Centre Optimization, Available here.
14 According to IOT Analytics (2024), Global Cloud Projects Report and Database 2024, Available here, 22% of recently announced cloud implementations include an AI element.
15 AI has risen rapidly among enterprise priorities, now ranking as a top five technology focus for businesses.
16 IBM, What Is a Data Centre?, Available here; AWS, What is a Data Centre, Available here.

Box 1 The main elements housed in data centres

- **Computing infrastructure** refers to the servers which deliver applications, services and data to the end user. The computing infrastructure is optimised to handle large amounts of simultaneous users and to process billions of calculations and transactions.
- **Storage infrastructure** refers to the systems where the data is stored. Data centres use specialised hardware and software which is designed to store, retrieve, manage and protect data at a massive scale.
- **Network infrastructure** is both the physical and logical layout of data flow within a data centre and decides how data flows both across servers and to end-users. Depending on the scale of a data centre, the data centre's required bandwidth can range from several gigabits to terabits per second.

Source: IBM, What Is a Data Center? [Link]

Data centres provide the physical space to house this main infrastructure as well as its supporting components such as the energy and cooling infrastructure needed to stay operating at all times. The need for such extensive infrastructure means that data centres can be large, with the average data centre size ranging roughly between 2,000 to 9,000 square metres, which is roughly equal to between one half to two football pitches.[17] For an overview of the data centres main supporting infrastructure, see Table **1**.

Table 1
Data centre supporting infrastructure

COMPONENT	DESCRIPTION
Power supply	Data centres need to be **always-on** to be able to provide the data access expected by end-users. To ensure this, most servers use **dual power supplies** and battery powered **uninterruptible power supplies** in order to protect against power surges and brief power outages.
Redundancy & disaster recovery	As downtime is costly for data centres and their end-users, a lot of effort is put into increasing the resiliency of the different systems. One main measure against loss or corruption of data is so-called **redundant arrays of independent disks (RAIDs)**. Other measures include **backup data centre cooling** if the main cooling system fails.
Environmental controls	Environmental factors such as temperature, humidity and static electricity can have severe adverse effects on hardware in data centres. Data centres therefore go to great lengths to control for these factors. A combination of **air cooling** and **liquid cooling** is used to control the temperature of hardware and reduce the risk of fires, as data centre hardware can reach very high temperatures. **Computer room air conditioning (CRAC)** to reduce humidity, which can cause equipment to rust.

Source: IBM (2024): What is a data center?, Available here.

Data centre infrastructure can vary based on its target customers and use cases. While on-premises or enterprise data centres are designed with a single company-specific use case in mind, large-scale data centres such as hyperscale and colocation data centres operate on massive scales and can

[17] IBM, What is a hyperscale data centre?, Available here.

service multiple clients at once. For an overview of different kinds of data centres and their respective use cases, see Table **2**.

Table 2
Overview of data centre types

DATA CENTRE TYPE	DESCRIPTION
Hyperscaler & cloud data centres	Large facilities which offer on-demand access to very powerful computing and data storage resources over the internet. Operated by cloud service providers such as AWS, Microsoft Azure, and Google Cloud.
Colocation data centres	Colocation data centres are facilities which offer space, power, and infrastructure for multiple customers based on their individual needs. It is a cost-effective way for businesses to gain access to extensive IT infrastructure without the need for significant capital investments.
Enterprise data centres	Owned and operated individual businesses, designed to meet very specific internal IT infrastructure criteria. Built to handle specific workloads or sets of applications.
Edge data centres	Smaller facilities located closer to end-users. Designed to offer low latency access to data and less powerful computing resources in relation to cloud- or colocation data centres. They are critical for applications such as video streaming and Internet of Things devices.

Source: Nlyte Software; Data Center Basics [Link].

CHAPTER 2

AI HAS THE POTENTIAL TO SUPPORT ECONOMIC GROWTH IN PORTUGAL

Key insights

- AI is a general-purpose technology that can deliver **substantial economic gains across various industries through higher productivity and more innovation**.
    - Higher productivity: AI helps automate repetitive tasks, allowing workers to focus on more strategic and creative tasks; and fosters efficiency and cost-reduction, e.g., by minimising human errors and optimising processes.
    - More innovation: AI enables large-scale real-time data analysis fostering better insights and decision-making; and enhances personalisation and customer experience, e.g., through improved quick and personalised customer support.
- AI is expected to drive significant contributions to GDP. Adoption could drive **a 7 per cent increase in annual GDP over the next 10 years**, with perhaps even greater potential in Portugal.
- The **development and adoption of AI requires robust digital infrastructure** capable of providing (i) substantial high-performance computing power (ii) fast, low-latency connectivity and (iii) secure and (iv) scalable capacity.
- **Data centres lay the foundation for large-scale AI model development, deployment and scaling of advanced AI technologies.** They are an integral part of the AI infrastructure required to develop and deploy AI solutions at scale. Data centres are the primary source of required computing power. Without sufficient computing power, AI systems cannot be effectively trained, scaled or used efficiently. Training and scaling advanced **AI systems require billions of operations and significantly more energy than traditional digital technologies**.
- As AI applications expand across industries, the demand for computational capacity in data centres is increasing. The increase in demand for **computing capacity for AI has been estimated to grow by as much as 33 per cent annually** between 2023 and 2030. By 2030, it is estimated that around 70 per cent of total demand for computing capacity will be for data centres equipped to host advanced AI workloads.

In this chapter, we explore the potential of Artificial Intelligence (AI) to support economic growth and innovation in Portugal. AI has the capability to enhance productivity across various sectors and create new economic opportunities. This chapter underscores the role of robust digital infrastructure, particularly data centres, in facilitating AI development and adoption. By examining the anticipated economic gains from AI and the increasing demand for data centre capacity, we set the stage for understanding the broader socio-economic benefits and strategic importance of investing in AI-ready data centres in Portugal.

The chapter is structured as follows:

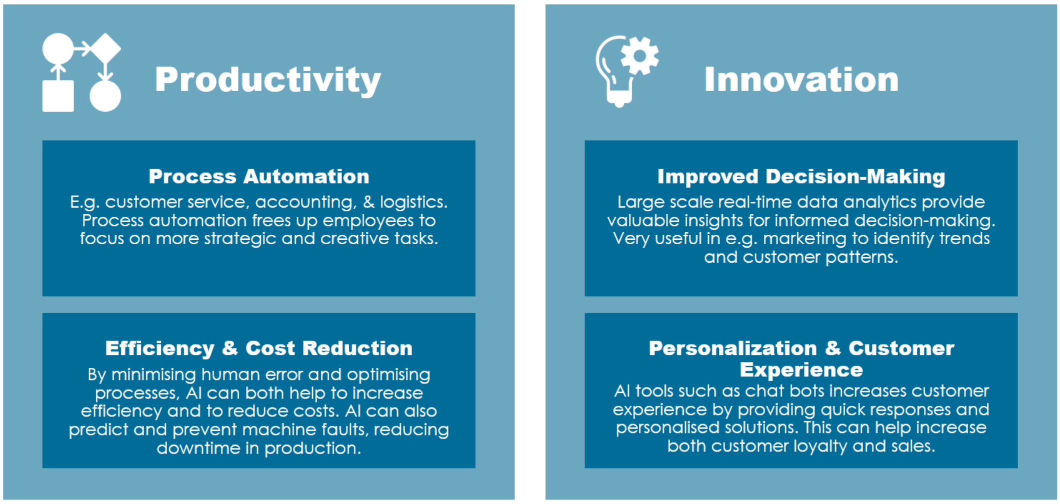
- In **section 2.1**, we describe how AI is expected to transform the economy to deliver substantial economic gains across sectors, including in Portugal.

- In **section 2.2**, we explain how the development and use of AI will depend on the availability of increased computing power supplied by robust digital infrastructure, particularly data centres.

2.1 AI IS EXPECTED TO DELIVER SUBSTANTIAL ECONOMIC GAINS

AI is a general-purpose technology, with applications that span the entire economy. As such, AI is set to deliver substantial economic gains by enhancing productivity and facilitating innovation across multiple industries.[18] AI breakthroughs not only improve existing processes but also generate new economic opportunities, fostering the development of innovative business models and driving long-term growth, see Figure **3**.

Figure 3
AI affects many facets of business growth and development



Source: Copenhagen Economics (adapted from ESADE[19]).

AI has the potential to enhance productivity across industries.[20] A study by PwC estimates that AI could increase worker efficiency globally by up to 40 per cent in capital-intensive sectors such as manufacturing and freeing up worker time for other tasks, helping businesses to achieve more without needing more resources, ultimately supporting increased economic growth.[21]

[18] Spence, M. (2024); AI's promise for the Global Economy, Available here.
[19] Ricart, Marc Cortés (2025), Advantages and challenges of AI in companies, ESADE, Available here.
[20] See, Acemoglu, D. (2025). The simple macroeconomics of AI. Economic Policy, 40(121), 13-58, Available here.
[21] PWC; Sizing the prize: What's the real value of AI for your business and how can you capitalise.

Beyond productivity, AI fuels innovation by supporting the creation of entirely new services and markets. From accelerating drug discovery and improving diagnostics to enhancing fraud detection and enabling autonomous vehicles, AI expands what is technologically possible:[22]

- Healthcare: AI can assist with diagnoses, identify pandemics and enable predictive healthcare based on genomic data.
- Automotive: AI enables smart cars and driver assistance, autonomous fleets with carpooling, predictive and autonomous maintenance.
- Financial services: AI can enhance the financial services industry by using machine learning algorithms to analyse large datasets, detect anomalies, and prevent fraud in real-time, thereby optimizing business operations and improving security.
- Retail: AI enables customised product design and customer data lists as well as automated inventory and delivery management.
- Public transportation: AI can optimise traffic flow by analysing real-time data from various sources, such as traffic cameras and sensors. This helps reduce congestion, improve road safety, and enhance urban mobility, ultimately benefiting the public by making transportation systems more efficient and reliable.[23]

For concrete examples of applications of AI across different sectors in Portugal, see Figure **4**.

[22] Trabelsi, M.A. (2024); The impact of artificial intelligence on economic development, Available here.
[23] Simons, W., Turrini, A., & Vivian, L. (2024); Artificial Intelligence: Economic Impact, Opportunities, Challenges, Implications for Policy, European Economy - Discussion Papers 210, Available here.

Figure 4
Case studies: AI is driving transformation across several industries in Portugal

Agriculture, Esporão

Esporão, **a leading olive oil producer in Portugal, uses AI to optimise irrigation, fertilisation, and cultivation practices, increasing yield.** AI drones monitor groves for pests, enabling targeted interventions and minimising pesticide use. AI algorithms predict optimal harvest times, ensuring peak quality. AI-powered irrigation systems manage water efficiently, while sensory analysis tools maintain high product standards. AI platforms process market trends, climate patterns, and consumer preferences, providing insights for informed decision-making. These advancements boost productivity, quality, and sustainability, positioning Esporão as a sector leader.

Financial regulation, Bank of Portugal

In 2023, the Bank of Portugal unveiled an in-house AI platform, Alya, used to automate and streamline operations such as banking supervision and answering complaints. The work that previously required a supervisor to read through hundreds of pages can now be streamlined via the use of Alya, **enabling a more comprehensive and efficient banking supervision**. Apart from only aiding the Bank of Portugal in decreasing its administrative burden, Alya has also shown promise through its market sentiment analysis function. For example, it helped to flag and centralise relevant information during Credit Suisse's collapse.

Healthcare, CUF Hospitals

Researchers explored implementing an AI-powered so-called **symptom assessment application** (SAA) called ADA in a Portuguese hospital network. The application helps patients by guiding them in symptom assessment as well as helping doctors with diagnostics decision. By providing personalised health information, ADA prepares patients for their consultation resulting in improved patient engagement and clinical conversation. The study found that **the implementation of SAA led to decreased anxiety for patients as well increased consultation efficiency for doctors.**

Manufacturing, Bosch

Bosch has **implemented an AI system in its Portuguese factories to detect and prevent anomalies and failures in manufacturing processes**. This AI solution, developed by the Bosch Centre for Artificial Intelligence (BCAI), analyses terabytes of data in seconds, helping to identify disruptions early and reduce rejected parts, thereby improving product quality. The system is connected to multiple production lines, enhancing efficiency, productivity, and sustainability. Pilot factories using this AI system have reported significant cost savings, with some saving between one and two million euros annually.

Source: Copenhagen Economics, based on the following resources: Agriculture (here), Financial regulation (here), Healthcare (here), Manufacturing (here).

A recent survey of CIOs[24] highlights the top benefits businesses are seeing, with productivity gains, improved customer experiences, accelerated digital transformation and improved employee experience emerging as the most widely cited outcomes, see Figure 5.

24 Chief information officers.

Figure 5
Productivity increases lies at the forefront added value from the use of generative AI
Per cent

Note: Based on the responses from 78 CIOs to the question "What are the top three types of business value your enterprise seeks from applying generative AI?".
Source: Gartner (2024), 2024 Gartner CIO Generative AI Survey[25]

Research suggests that AI adoption can significantly boost GDP. One study by Goldman Sachs indicates that AI could increase annual global GDP by 7 per cent over 10 years, equivalent to USD 7 trillion, with perhaps even greater potential in economies with a favourable industry composition, such as Portugal.[26] Similarly, other studies have also found large potential economic benefits.[27]

High-income countries with advanced economies and digital infrastructure, like Portugal and other European countries, are particularly well-positioned to benefit from AI-driven growth.[28] Although estimates vary, different studies estimate that AI adoption can lead to significant economic gains in Portugal. One study by Implement Economics finds that at the current rate of adoption, Generative AI can increase Portugal's annual GDP 8 per cent by 2034.[29] Early evidence supports this potential

[25] See Gartner (2024), Top Strategic Technology Trends for 2025: Agentic AI, Available here
[26] Hatzius, J., Briggs, J. (2023). The potentially large effects of artificial intelligence on economic growth. Goldman Sachs, Available here. (Accessed: 19 March 2025)
[27] A report commissioned by Amazon Web Services (AWS) estimates that AI adoption could contribute EUR 600 billion to the European economy by 2030, with the total economic impact of technological adoption reaching EUR 3.4 trillion. See, Amazon (2024); AI adoption forecast to unleash €600 billion growth in Europe's economy, with the total economic impact of technological adoption reaching EUR 3.4 trillion, Available here. The gross value-added from AI adoption by 2030 would amount to approximately 3.0 per cent of the forecasted 2030 EU GDP using a conservative estimate by Copenhagen Economics, EU GDP forecast obtained from OECD (2024); World Economic Outlook Database: October 2024 (Accessed: 19 March 2025).
[28] Kalai, M., Becha, H. & Helali, K. (2024); Effect of artificial intelligence on economic growth in European countries: a symmetric and asymmetric cointegration based on linear and non-linear ARDL approach, Available here.
[29] Implement Consulting Group (2024); The economic opportunity of generative AI in Portugal, Available here.

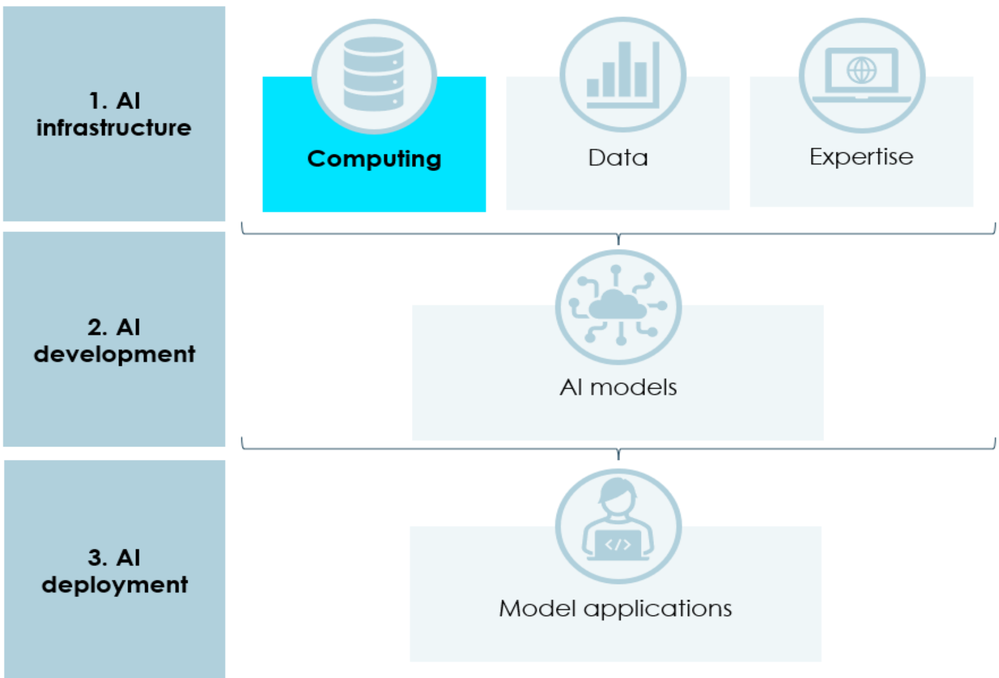
— 70 per cent of Portuguese businesses that have adopted AI report increased productivity and revenue, with 43 per cent of businesses anticipating further productivity boosts.[30]

2.2 DATA CENTRES UNDERPIN THE GROWTH OF AI

Data centres are a crucial component of the development of AI solutions. The development and deployment of AI technologies depend on robust digital infrastructure, particularly data centres, which provide the computing power and connectivity needed to power advanced AI systems. As demand for AI applications accelerates, investment in digital infrastructure will be critical to keep pace.

AI models demand significantly more computing power than traditional digital workloads. Some estimates suggest AI workloads require approximately 14 times the computing capacity of conventional workloads. This is driven by the growing complexity of AI systems — for instance, the computing power used in AI has doubled every six months since 2015. Training and scaling modern AI systems requires billions of operations and significantly more energy than traditional digital technologies. Alongside data and expertise, computing power is one the most critical inputs in AI development and innovation, see Figure **6**.[31]

Figure 6
Data centres lay the foundation for large scale AI model development



Source: Adapted from the Competition and Markets Authority (2024): CMA AI Strategic Update; [Link].

[30] Implement Consulting Group (2024); The economic opportunity of generative AI in Portugal, Available here.
[31] Some authors consider a variation of these inputs, e.g., Vipra & West (2023): Computational Power and AI, Available here, identifies data, computing power and software as the key input for AI development.

AI development and deployment generate extensive computing workloads, which can be generally categorised into (i) AI training and (ii) AI inference. Each type of AI workload has distinct features with implications for data centres' infrastructure and operations:

- **AI training** refers to the development of AI models. With more time spent training and fine-tuning an AI model, the performance improves for end-users.[32]AI training regards the further development of AI models to increase both the efficiency and the scope of tasks that the models can complete.[33] This is a compute-heavy and time-consuming task.

- **AI inference** refers to the delivered AI services utilised by end-users, where the model recognises patterns in data and infers conclusions based on user prompts.[34] It is, in essence, the application of an already trained AI model. Since this type of workload prioritises low latency and real-time output over heavy computation, it is more sensitive to the proximity of data centres to data sources and end-users for faster connectivity.

AI is accelerating the demand for data centre computational power, making data centres critical to enabling its continued development. AI models are rapidly increasing in size and complexity. For example, OpenAI's GPT-3, released in 2020, had over 100 times more parameters than GPT-2. Supporting the growth of AI models requires infrastructure with more and faster computational power (i.e., machines). McKinsey estimated that round 70 percent of total demand for data centre capacity will be for data centres equipped to host advanced-AI workloads by 2030.

The data centre sector is expected to grow significantly in the coming years. The demand for data centre capacity has been estimated to grow by as much as 22 per cent annually between 2023 and 2030, driven by AI and other digital services. Demand for centre capacity for generative AI workloads is expected to grow 39 per cent annually in the same period, while demand for capacity for other (more traditional) workloads is expected to grow 16 per cent.[35]

> The use of AI requires significant computing power, not only for training but also for model deployment, for which data centres are essential. It is natural that demand will continue to grow significantly in the coming years, especially due to the multiplication of employed models.

Source: Professor Doutor Arlindo Oliveira

The expansion of the sector will require significant investments. According to estimates, industry leaders will have to make unprecedented levels of investments into their technological

32 Cloudflare (2025), What is AI inference?, Available here.
33 Equinix (2024), How AI Infrastructure Supports Training, Inference and Data in Motion, Available here.
34 IBM (2024): What is AI inference?, Available here.
35 McKinsey & Company (2024); AI power: Expanding data centre capacity to meet growing demand, Available here.

infrastructure to maintain their position.[36] In Europe alone, an estimated USD 250 to 300 billion in infrastructure investment is required to meet rising AI-related demand.[37]

> Portugal's digital strategy action plan recognises that promoting the creation of robust digital infrastructures such as AI-ready data centres — both public and private — to support innovation and the growth of emerging technologies like AI and machine learning models a should be a priority, recognising the benefits that they can deliver.

Source: Head of National Strategic Initiatives, Portuguese National Innovation Agency (ANI);

Increasingly demanding AI models will impact the cost and scale of data centres which are expected to scale up substantially in both size and capacity.[38] Beyond the significant investments required in the data centre sector, the size of data centres is also growing significantly. Increasingly demanding AI models will impact the cost and scale of data centres which are expected to scale up substantially in both size and capacity.[39] While today's large centres typically range from 50 to 200 megawatts (MW), new developments are pushing beyond 1 gigawatt (GW), highlighting the scale of investment needed to support next-generation AI systems.[40] A single AI-optimized data centre can cost between USD 40 billion and USD 50 billion.[41]

> The development of the data centre sector and broader digital infrastructure contributes to the broader development of the digital economy. Having well-equipped data centres is crucial for the advancement of science and technology.

Source: General Coordinator, Foundation for National Scientific Computation (FCCN/FCT)

36 Bain & Company (2024); AI Changes Big and Small Computing, Available here.

37 McKinsey (2024); The role of power in unlocking the European AI revolution, Available here.

38 According to Goldman Sachs, "given the higher processing workloads demanded by AI, the density of power use in data centres is likely to grow as well, from 162 kilowatts (kW) per square foot [in 2023] to 176 kW per square foot in 2027". See Goldman Sachs (2025), AI to drive 165% increase in data centre power demand by 2030, available here.

39 According to Goldman Sachs, "given the higher processing workloads demanded by AI, the density of power use in data centres is likely to grow as well, from 162 kilowatts (kW) per square foot [in 2023] to 176 kW per square foot in 2027". See Goldman Sachs (2025), AI to drive 165% increase in data centre power demand by 2030, available here.

40 Bain & Company (2024); AI Changes Big and Small Computing, Available here.

41 BlackRock Investment Institute, Thunder Said Energy. November 2024. "The estimated costs are across three components for data centers. Data center infrastructure relates to the full infrastructure build, excluding the cost of chips and servers. Power supply costs relate to the building of facilities needed to power data center". See BlackRock (2025), Larry Fink's 2025 Annual Chairman's Letter to Investors, Available here.

The EU is focused on building a large-scale AI data and computing infrastructure to achieve AI leadership. Several new and existing programmes have been put in place to fortify Europe's ambitious plans to exploit the untapped potential of AI and related technologies. These programs recognise the need to channel (public and private) funds to finance significant investments in essential digital infrastructure in the EU, aiming to at least triple data centre and cloud capacity over the next five to seven years, see Box **2**.

Box 2 The EU is introducing new initiatives to foster AI research and development

Recent initiatives within the EU to foster AI investments shows race towards leveraging the economic benefits of AI services. Most recently the European Commission launched the InvestAI initiative at the AI Action Summit in Paris and announced the AI Continent Action Plan.

The InvestAI aims to mobilise EUR 200 billion for AI investments, with a substantial reliance on private sector contributions, which are expected to amount to EUR 150 billion.[42] This includes a EUR 20 billion fund to mobilise private investment in up to five AI gigafactories across the EU. These gigafactories will be large-scale facilities equipped with approximately 100,000 state-of-the-art AI chips, four times more than current AI factories, and focus on training highly complex and large AI models, which are essential for breakthroughs in the critical industrial sector and science.[43]

The European Commission has also announced it will propose a Cloud and AI Development Act to further stimulate private sector investment in data centres and cloud capacity, with the goal of at least tripling the EU's data centre capacity in the next five to seven years, prioritising highly sustainable data centres.[44]

Additionally, the plan aims to develop AI talent through the AI Skills Academy and simplify regulations with the AI Act and the AI Act Service Desk. The next steps involve public consultations on various AI-related strategies and engaging with industry representatives to shape AI adoption. This comprehensive approach is designed to drive AI innovation, enhance Europe's competitiveness, and ensure technological sovereignty.

Source: European Commission

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[42] See Euractiv (2025), Von der Leyen launches world's largest public-private partnership to win AI race, Available here.; European Commission (2025), EU launches InvestAI initiative to mobilise €200 billion of investment in artificial intelligence, press release 11.02.2025, Available here.

[43] According to the European Commission, 13 AI factories are already being deployed around EU's world-leading supercomputers to support EU AI startups, industry and researchers in developing AI models and applications. European Commission (2025), Commission sets course for Europe's AI leadership with an ambitious AI Continent Action Plan, Press release 9.04.2025, Available here.

[44] European Commission (2025), Commission sets course for Europe's AI leadership with an ambitious AI Continent Action Plan, Press release 9.04.2025, Available here.

CHAPTER 3

PORTUGAL HAS FAVOURABLE CONDITIONS FOR DATA CENTRE DEVELOPMENT

Key insights

- **Portugal has particularly favourable conditions** for data centre development along four dimensions.
- *First*, Portugal has an **advantageous geographic location and robust connectivity** infrastructure that benefits data centre operations. In particular, Portugal:
  1. Is a hub for **global subsea cable connectivity**. Around 25 per cent of the global subsea cable network is estimated to pass through the country.
  2. Has a **geographic location that enables reduced average latency** times in connections with important economic centres of activity, both within Europe and across other continents
  3. **High coverage of fibre networks.** Portugal ranks third in Europe in terms of coverage of fibre networks (92 per cent of households covered). High coverage of fibre networks enables fast, stable and safe data transmission and contributes to reducing setup costs in greenfield investments.
- *Second,* Portugal has **comparatively low energy prices compared** with the rest of the EU. Portugal's electricity prices were 30 per cent lower than the EU average in the first half of 2024.
- *Third*, the country benefits from **access to renewable energy and water cooling solutions,** which can be key to data centres:
  1. **Large supply of electricity from renewables**: In 2024, 87.5 per cent of net electricity generation in Portugal was from renewables (the second highest in the EU).
  2. **Access to seawater for cooling**: Proximity to the Atlantic enables data centre water cooling solutions that contribute to reducing energy and freshwater consumption and operational costs
- *Fourth*, Portugal provides **access to a pool of skilled professionals in key areas relevant to data centres**. Portugal has approximately 230,000 IT specialists – workers with the ability to develop, operate and maintain ICT systems – comprising 4.5 per cent of the workforce and stakeholders perceive the talent pool in Portugal as highly skilled.

In this chapter, we provide an overview of various characteristics that make Portugal an especially attractive destination for data centre infrastructure, departing from those identified by the stakeholders interviewed.

The chapter is structured as follows:

- In **section 3.1**, we explain how Portugal's geographic location is favourable for data centre operators, owing to the well-developed networks of subsea connectivity (section 3.1.1), the high coverage of high-capacity networks (section 3.1.2), and the relative proximity to important global and European economic centres of activity (section 3.1.3).

- In **section 3.2**, we briefly outline the significant energy requirements of data centres and examine how the comparatively low energy prices contribute to the country's competitiveness to attracting data centre investments.
- In **section 3.3**, we explain how data centre operators can benefit from Portugal's supply of electricity from renewables (section 3.3.1) and access to the Atlantic for efficient water cooling solutions (section 3.3.2), which can reduce electricity and freshwater consumption.
- In **section 3.4**, we discuss the availability of skilled labour in Portugal and how it contributes to the country's ability to attract data centre operators.

3.1 A STRATEGIC LOCATION AND ROBUST CONNECTIVITY

As we outline in the following, Portugal has a unique geographic location, which makes it well-suited for the development of data centres due to its role as a subsea cable hub and its proximity to key regions. Moreover, the country benefits from a robust terrestrial fibre network, which further strengthens Portugal's conditions to host data centres.

As major European cities face challenges such as land shortages, high energy costs, and grid capacity constraints, Portugal is emerging as an alternative location to traditional data centre hub locations.[45, 46, 47]

3.1.1 A hub for global subsea cable connectivity

Proximity to subsea cables' landing stations is a critical factor in selecting a data centre location because it directly impacts connectivity, latency, and global reach.[48] Undersea fibre optic cables form the backbone of international data transmission, carrying vast amounts of digital traffic between continents with minimal delay. Estimates indicate that more than 97 per cent of the world's internet traffic is transmitted via subsea cables.[49] Being close to landing stations reduces the distance data must travel, ensuring faster speeds, lower latency, and higher reliability—key requirements for cloud computing, financial transactions, and AI-driven applications.[50]

Additionally, direct access to multiple subsea cables enhances redundancy and network resilience, reducing the risk of outages. As global data demand rises, locations with strong subsea cable infrastructure gain a competitive edge in attracting tech investment.

Portugal's subsea cable infrastructure makes it a good potential location for data centres, offering high-performance, resilient, and secure global connectivity. Portugal occupies a geo-strategic position, with about 25 per cent of global subsea cables estimated to cross its Exclusive Economic Zone

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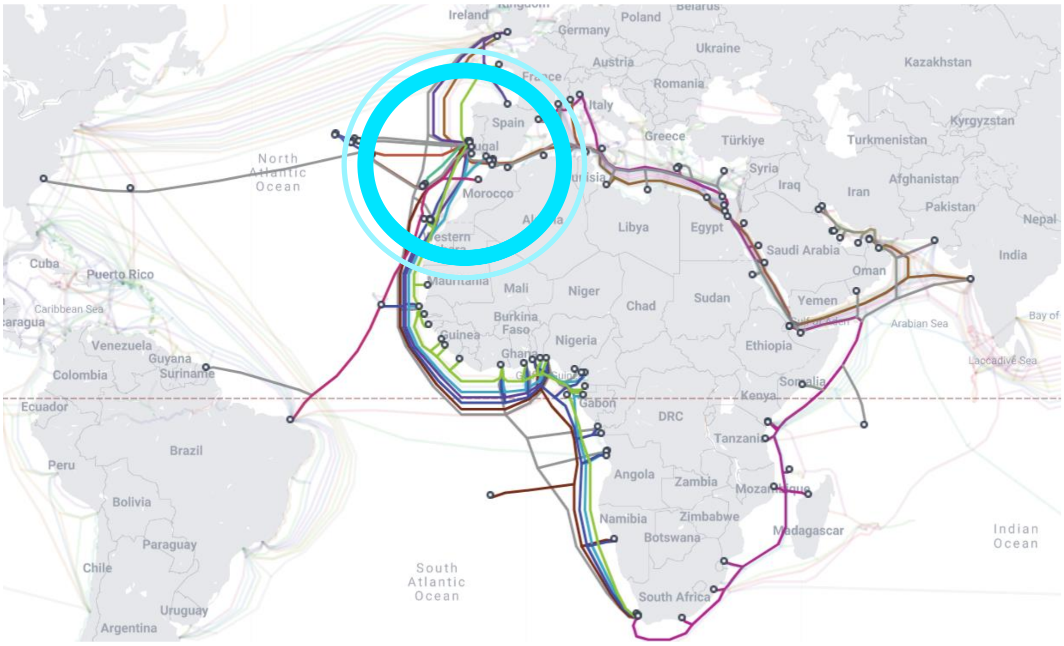
45 Exame Informática (2025); Vão ser investidos 950 milhões de euros em centros de dados em Portugal em 2025; (link)
46 Sena, M. (2025); Expanding data centres in Portugal: a strategic market in the European landscape; (link).
47 From an interview conducted by Copenhagen Economics with João Brás from CBRE (Portugal) in February 2025.The current dominant cities like Frankfurt, London, Amsterdam, and Paris (FLAP locations) are becoming increasingly saturated with operators seeking to move to emerging markets, such as Portugal.
48 EllaLink (2023); Subsea cables and data centres: two sides of the same coin, Available here.
49 The European Union Agency for Cybersecurity, ENISA (2023), Subsea cables - What is at stake?, Available here.
50 Stellium; Global Submarine cables and data centre connectivity, Available .

(EEZ).[51] It is the only country directly connected via subsea cables to all inhabited continents, see Figure 7.[52]

Figure 7
Portugal plays a key role in the global interconnectivity of the EU



Note: Portugal's current submarine cable map. Emphasis added by Copenhagen Economics.
Source: Telegeography (2025).

> The existing subsea cable infrastructure in Portugal contributes to more reach, resilience and lower latency – it is one of the main advantages the country has in attracting data centre operators

Source: Wholesale Director, Altice

Cable landing stations in Portugal are strategically placed at five separate locations on the mainland, providing redundancy and resiliency against potential disruptions. Four of these five landing

[51] Bernardino, Luís M. (2024), Geostrategic position of Portugal in the global submarine cable network. Challenges and Opportunities, Eurodefense, Available here.
[52] Lopes, P. (2024), EU Invests €865 Million in Digital Connectivity, The Portugal News, Available here.

stations are within a 100-kilometre radius of Portugal's three main Internet Exchanges (IXs) in Lisbon, creating a highly concentrated and interconnected network infrastructure.[53]

This robust subsea cable infrastructure further enhances Portugal's position as a prime data centre location, offering secure, reliable, and future-proof digital connectivity. Additionally, in 2022, 97 per cent of Africa's interregional bandwidth and 90 per cent of the Middle East's bandwidth were connected to Europe, highlighting Europe's, and particularly Portugal's role in linking these regions to the rest of the world.[54]

> The privileged subsea cable connections to Africa give the data centre sector in Portugal a unique opportunity to expand and export computing power to support digital services in countries with growing populations and digital habits

Source: Managing Director for Portugal, Equinix

Portugal is strengthening its position as a global connectivity hub and is set to add even more subsea cable links in the coming years. In 2021, the EllaLink undersea cable became operational, creating a novel connection between Europe and South America by linking Portugal to Brazil, reducing latency by 50 per cent.[55] Portugal's cable routes will soon become even more diverse with the Nuvem direct subsea cable launch in 2026, establishing a direct link to the east coast of the USA, and the PISCES subsea cable launch in 2028 connecting it to Ireland.[56,57] Global businesses, such as Google, Amazon and Meta, have identified Portugal as a relevant player for infrastructure investments, with Google, the world's largest owner and investor in subsea cable networks, planning a transatlantic subsea cable connecting Portugal to the USA.[58,59]

3.1.2 High coverage of fibre networks

Reliable, high-speed connectivity is essential when choosing a data centre location, and fibre optic infrastructure plays a key role in ensuring optimal performance. According to the stakeholders interviewed, high coverage of high-speed networks signals the technological maturity required to ensure stable and safe connections and contributes to reducing setup costs in greenfield investments.[60]

Fibre networks provide significantly higher bandwidth and lower latency than traditional copper cables, enabling fast data transmission for cloud computing, AI, and financial services. They also offer greater security, energy efficiency, and durability, making them a future-proof solution for

54 Mauldin, A. (2022); Cutting off Europe? A Look at How the Continent Connects to the World, Available here.
55 Ellalink provided "a latency reduction of up to 50% between LatAm and Europe and direct city-to-city connectivity", Available here.
56 Google (2023); Meet Nuvem, a cable to connect Portugal, Bermuda, and the US.
57 Yadav, N. (2025); Pisces subsea cable to connect Ireland to EU nations now due by 2028, Date Centre Dynamics, Available here.
58 Wallace, B. (2025); Amazon, Meta and Google Plan Subsea Cable Expansion, Available here.
59 Miguel, I.P. (2025); Cabos submarinos potenciam "verdadeira economia do futuro" em Portugal, Available here.
60 Cf. E.g., interview with NOS and Altice Portugal.

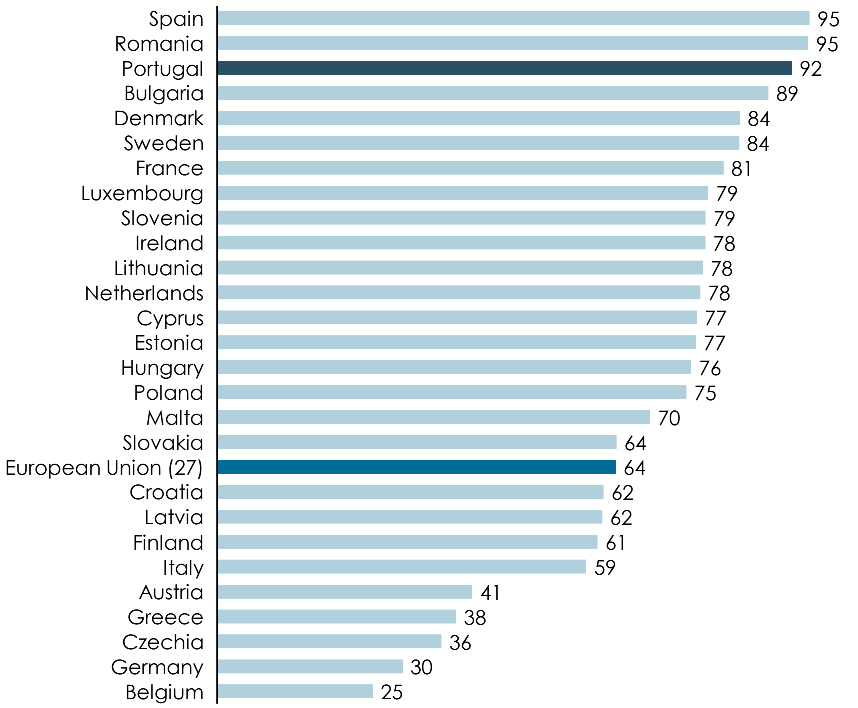
large-scale digital operations. Additionally, fibre can transmit data over long distances without signal degradation, supporting seamless global connectivity.[61]

> Constructing and running data centres requires advanced connectivity networks. Portugal has good conditions to ensure this connectivity, thanks to the investments in next-generation networks [that] operators have been doing over the years

Source: B2B Cloud and Data centre Manager, NOS

Portugal ranks third in Europe for fibre-to-the-premises (FTTP) coverage at 92 per cent in 2023, which suggests good access to infrastructure providing reliable, high-speed connectivity, compared with other EU countries, see Figure **8**.[62,63]

Figure 8
Portugal has some the best fibre-to-the-premises (FFTP) coverage in Europe
Per cent of households



Note: Fibre to the premises (FTTP) coverage in 2023.
Source: European Commission (2024); DESI indicators; (link)

[61] VOLICO (2024); Maximizing Data Centre Connectivity with Fiber Optic Connectivity.
[62] FTTH Council Europe; FTTH Forecast for EUROPE: Market forecast 2022-2027; p. 10
[63] DE CIX (2024); Portugal: a global interconnection hub, p. 8.

3.1.3 Proximity to important global and European economic centres of activity

Portugal's central geographic location also favours reduced average latency times with important global connections. Minimising the distance data travels contributes to reducing latency in data centres. Proximity to key regions with significant data traffic can therefore be an advantage for data centres' performance. Research shows that Lisbon has comparatively low average (flight) distances to major global economic and population centres on five continents: London, New York, Rio, Hong Kong, and Johannesburg. [64] While flight paths are typically shorter than cable routes, they serve as a close proxy.

Proximity between data centres and end-users (e.g., business users and private consumers) can be beneficial for three reasons: (i) reduced latency; (ii) increased security; and (iii) improved operational and cost-efficiency:

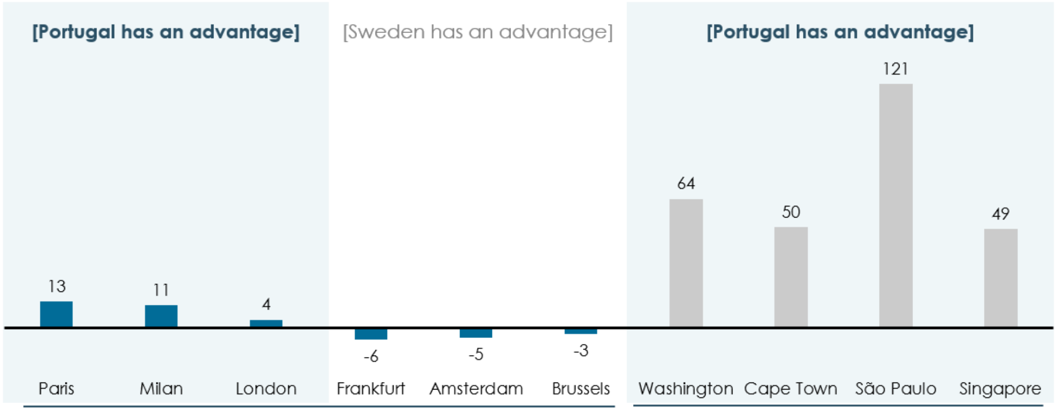
- *Reduced latency*: One of the most significant advantages of using close-proximity data centres is their effects on the latency of a business or institution's connection to its data. Lower latency means that the responsiveness of models and data which flows through the data centre increases significantly. This means faster processing times and is a crucial feature for applications that use real-time data analysis and calculations.[65]

- *Reliability and security:* Reliability and security in data and network access are also factors that increase the efficiency of operations via closer proximity to data centres. Proximity data centres require fewer "network hops" due to their closeness to end-users and data sources, which reduces the chances of data congestion and interruptions and ensures better uptimes for their users. The security of data in data centres is also more extensive than what would be feasible for individual businesses to maintain due to their economies of scale. Such features include state-of-the-art surveillance systems to ensure data integrity, as well as custom redundant cooling systems to ensure physical data safety.[66]

Latency is influenced by various factors beyond geographical distance, including infrastructure quality, routing efficiency, and network congestion. With its access to fibre cables as well as its great fibre network coverage, Portugal can leverage these factors to provide greatly reduced latency when compared to other data centre hubs with similar geographical distances, such as Sweden. This advantage is evident in both intra-EU and global connectivity. Portugal compares favourably to another European data centre hub, Sweden, in terms of latency to EU cities, with only minor disadvantages at its worst and significant advantages over longer distances at its best. Globally, Portugal consistently outperforms Sweden in terms of latency. For an overview of Portugal's comparative advantage, see Figure **9**.

64 DE CIX (2024), Portugal: a global interconnection hub, p. 14.
64 DE CIX (2024), Portugal: a global interconnection hub, p. 11.
65 Data Centres (2025), Does It Matter Where My Data Centre Is Located?, Available here.
66 Etix Everywhere (2023), Edge Data Centre: Unlocking the Benefits of Proximity Colocation for Enhanced IT Infrastructure. Available here.

Figure 9
Portugal has a latency advantage compared to Sweden for many centres of economic activity*
Differences in latency (i.e., round-trip delay) between Portugal and Sweden (in milliseconds)



Note: *The comparison between Portugal and Sweden is based on the locations of Sines and Stockholm only. This comparison illustrates how Portugal has competitive connections with key cities in the EU in terms of latency comparing with other emerging data centre hubs (e.g., the Nordics). We have not compared other locations in Portugal to other locations in Europe, apart from Stockholm. This analysis does not account for the importance of different traffic flows, e.g. weighing different connections by traffic.
Source: Copenhagen Economics, based on data from Start Campus

3.2 COMPARATIVELY LOW ENERGY PRICES

Data centres require substantial amounts of energy to operate due to the extensive computing power and cooling systems needed to maintain optimal performance.[67] In 2024, the electricity consumption of data centres comprised roughly 1.8 to 2.6 per cent of all electricity consumption in the EU.[68] Electricity is the largest expense in data centre operations, accounting for between 46 per cent and 60 per cent of total data centres' operational expenditure, mostly driven by computing and server cooling.[69,70,71] The storage of AI-generated data is expected to further increase energy requirements in the coming years.

67 According to Statista Research Department, "Newly constructed hyperscale data centres require power capacities of at least 100 megawatts, which amounts to an annual electricity consumption equivalent to that of more than 400,000 electric vehicles". See Statista Research Department (2024). Data centre power consumption - statistics & facts, Available here. (Accessed 13 March 2025).
68 Publications Office of the EU (2024), Available here.
69 IDC (2024); IDC Report Reveals AI-Driven Growth in Data Centre Energy Consumption, Predicts Surge in Data Centre Facility Spending Amid Rising Electricity Costs, Available here.
70 We acknowledge that electricity prices are a key factor in data centre operations. However, this report does not aim to provide a comprehensive cost comparison of different locations but rather analyse factors that make Portugal conducive to data centre operations.
71 International Energy Agency (2024), Available here.

Energy requirements and consumption are even higher for 'AI-ready' data centres.[72] As digital services expand, computational demands grow, leading to higher energy consumption. AI workloads, in particular, are far more energy-intensive than traditional ones, with some estimates suggesting that AI-specific infrastructure requires up to 14 times more power density (i.e., power per rack of servers).[73]

> The guarantee of access to energy at competitive prices is fundamental [for data centres], especially for new data centres more tailored to AI workloads that require much vaster amounts of energy than the traditional data centre

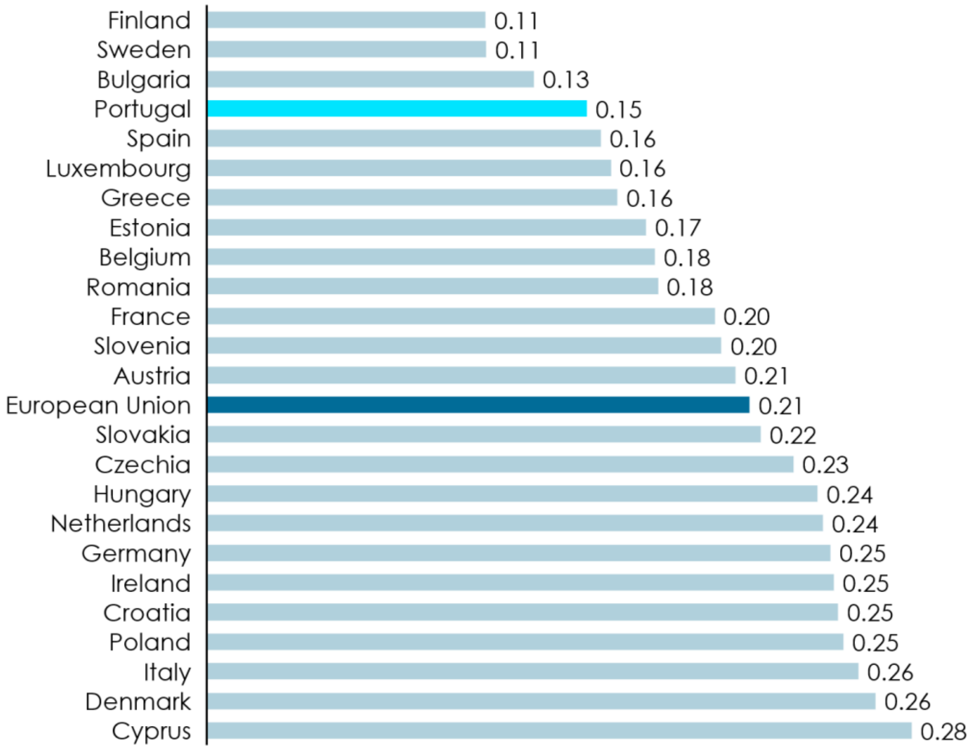
Source: B2B Cloud and Data centre Manager, NOS

Portugal has low electricity prices compared with other European countries. In the first half of 2024, electricity prices in Portugal were 30 per cent lower than the EU average. The average price of electricity was 0.21 euros per kilowatt-hour in the EU and 0.15 euros per kilowatt-hour in Portugal, see Figure **10**.

72 McKinsey & Company (2023). AI power: Expanding data centre capacity to meet growing demand, Available here. (Accessed: 13 March 2025).

73 McKinsey & Company (2023). AI power: Expanding data centre capacity to meet growing demand, Available here. (Accessed: 13 March 2025). Considering that training advanced AI models consume more than 120 kW per rack, the average power density required for more traditional loads was estimated at approximately 8.5 kW.

Figure 10
Portugal has comparatively low electricity prices for non-household consumers in the EU
Euro per kilowatt-hour (kwh)



Note: Electricity prices for non-household consumers, based on available Eurostat data, including all consumption bands, in the first half of 2024. Prices shown are inclusive of all taxes and levies.
Source: Eurostat (2025); Electricity prices for non-household consumers - bi-annual data (from 2007 onwards).

Portugal's low electricity prices make it an attractive location for data centres. Given the significant power demands of data centres, lower electricity prices can translate into substantial cost savings and increased profitability.[74] For illustration, the price advantage in Portugal would translate to potential cost savings between EUR 3.6 and EUR 5.2 billion when applied to the total electricity consumption of EU data centres.[75]

[74] Kamiya, G. and Bertoldi, P.(2024); Energy Consumption in Data Centres and Broadband Communication Networks in the EU, Available here.
[75] Eurostat (2025); Electricity prices for non-household consumers - bi-annual data (from 2007 onwards); online_code: nrg_pc_205, Available here.

> Competitive energy prices are a very relevant factor for data centre operators when deciding on an investment. In this dimension, Portugal compares very well with other EU countries, being among the countries with the lowest prices.

Source: Managing Director for Portugal, Equinix

3.3 ACCESS TO RENEWABLE ENERGY AND WATER COOLING SOLUTIONS

3.3.1 Access to a large supply of electricity from renewable sources

The substantial energy requirements can pose a challenge for the data centre sector, especially if the electricity powering them is produced from fossil fuels. Their large energy consumption can result in significant environmental impacts, such as increased greenhouse gas emissions. Data centres were estimated to account for 2 per cent of global greenhouse gas emissions in 2023.[76]

Emissions from data centres have grown only modestly since 2010 despite the rapid growth in demand for digital services, due to energy efficiency improvements and renewable energy purchases. However, emissions from the sector must drop by half by 2030 to achieve a net zero carbon-dioxide emissions by 2050, outlined by the Net Zero Emissions by 2050 Scenario (NZE Scenario).[77]

Renewable energy can be both cost-effective and an environmentally friendly option, making it the preferred choice for powering these facilities.[78]Data centres are increasingly turning to clean energy sources to reduce their carbon footprint and broader environmental impact as energy demands grow. These facilities have significant power demands, ranging from 5-10 megawatts on average, with large hyperscale centres exceeding 100 megawatts, comparable to an electric arc furnace steel mill.[79] At the same time, regulatory pushes such as the Renewable Energy Directive (RED) may require data centres to source a greater share of their energy from renewables.[80]

Portugal offers conditions to mitigate environmental impacts in part due to its high supply of renewable energy. The country's renewable power capacity has been growing steadily over the last years, surpassing 18 gigawatts in 2023, representing a share of over 86 per cent of the total installed

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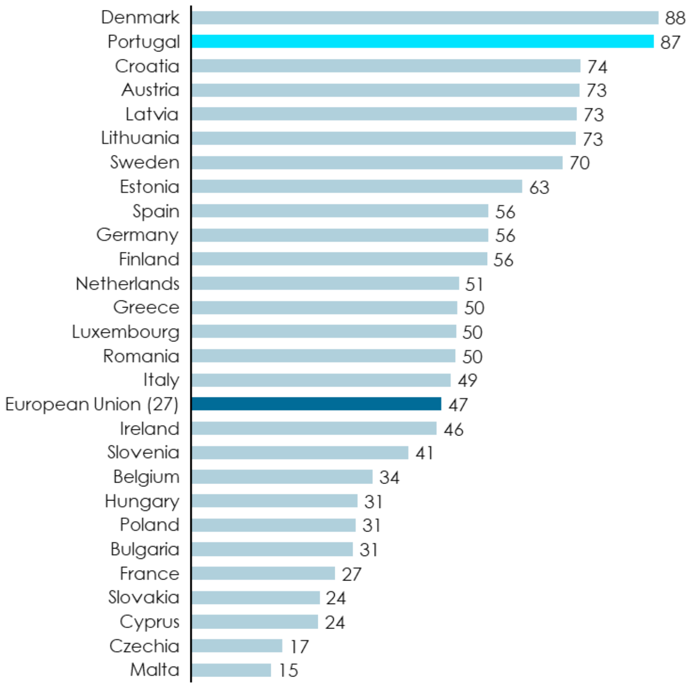
76 Giannelis, M. (2023); The Environmental Impact Of Data Centres, Available here.
77 Rozite, V. (2023); Data Centres and Data Transmission Networks.
78 Atkison, T. (2024); Leading the charge: Surge in US data centre growth is powering renewable energy investment opportunities, Available here.
79 Spencer, T. & Singh, S. (2024); What the data centre and AI boom could mean for the energy sector. International Energy Agency, Available here.
80 Weiler, S. (2024); Powering the future: renewable energy and hydrogen for data centres, Available here.

capacity in the country.[81] In April 2024, 95 per cent of the country's electricity needs were provided by renewable sources, mainly from hydro, wind and solar.[82]

Within the EU, Portugal is at the forefront of electricity generation using renewables. According to Eurostat, in 2024, Portugal was the country in Europe with the second highest share of net electricity generated from renewable sources (87.5 per cent), only behind Denmark (88.4 per cent), see Figure **11**.[83]

Figure 11
Portugal has the second-highest share of net electricity generated from renewable sources in the EU
Per cent



Note: Annual share calculated using monthly data on (i) total electricity generation (in GWh) and (ii) total electricity generated from renewables and biofuels (in GWh), as per the standard international energy product classification (SIEC), used by Eurostat.
Source: Eurostat (2025); Net electricity generation by type of fuel - monthly data; online_code: nrg_cb_pem (Available here)

[81] Fernandez, L. (2024); Renewable energy in Portugal - statistics & facts, Available here.
[82] Euronews Green (2024); Renewables are meeting 95% of Portugal's electricity needs. How did it become a European leader?, Available here. Electricity from renewables originates from three key sources: (i) hydroelectric plants, (ii) wind, and (iii) solar, representing 40, 38 and 13 per cent of total renewable generation during 2024, respectively.
[83] Fernandez, L. (2024); Renewable energy in Portugal - statistics & facts, Available here.

Looking ahead, Portugal has set ambitious energy targets that will require even further production and use of renewables, aiming to achieve Net Zero by 2045, five years ahead of its initial goal.[84]

3.3.2 Access to the Atlantic enables data centre cooling

Data centres generate significant heat as a byproduct of operations, with cooling systems typically consuming up to 40 per cent of their total energy consumption.[85]

Traditional data centre cooling relies on air-based systems, which consume significant energy and have limitations in dealing with high-density heat loads. For example, computer room air conditioning units recirculate cooled air but face limitations in scalability and precision, while raised floors that distribute cold air through perforated tiles is a method prone to airflow mismanagement in modern, densely packed server environments.

Newer liquid cooling systems using seawater can be more energy efficient, in particular for AI-driven workloads, and reduce consumption of fresh water.[86] Seawater cooling systems leverage the relatively constant and low temperature of seawater to achieve high energy efficiency, making them suitable for modern data centres, especially those handling AI-driven workloads for which air cooling systems can be less efficient.

Several data centres in Europe have successfully implemented seawater cooling solutions, including Google's facility in Hamina, Finland, and Interxion's data centre in Stockholm, Sweden. Interxion reported a significant improvement in energy efficiency, reducing energy use and leading to annual savings of USD 1 million in 2013 from using seawater cooling at its facilities.[87]

Portugal's proximity to the Atlantic enables cost-efficient data centre cooling using seawater, reducing energy consumption and operational costs. For example, Start Campus' data centre located in Sines, Portugal, is developing an innovative seawater cooling solution leveraging the ocean as a natural heat sink.[88]

> Access to cooling sources can be a key issue for data centres, especially as workloads become more demanding. The fact that Portugal has such an extensive coastline relative to its size favours makes it attractive to operators looking to use advanced cooling solutions using seawater

Source: CBRE

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84 See additional details on Portugal's climate action strategy here.

85 McKinsey & Company (2023); Investing in the rising data centre economy, Available here.

86 Latif, I., Ashraf, M. M., Haider, U., Reeves, G., Untaroiu, A., & Browne, D. (2024), Advancing Sustainability in Data Centers: Evaluation of Hybrid Air/Liquid Cooling Schemes for IT payload using Sea Water. IEEE Transactions on Cloud Computing, Available here.

87 Niccolai (2013); Swedish data centre saves $1 million a year using seawater for cooling, Available here.; Coors, Lex (2012), Case study: Recycling data center seawater amplifies energy savings, Available here.

88 Jacobs (2025); SINES DC by Start Campus. Putting sustainability at the heart of data centre design, Available here.

3.4 ACCESS TO SKILLED PROFESSIONALS

Data centre constructions and operations require professionals with specialised technical skills across a range of roles, including engineers, project managers, critical environment technicians and system administrators.[89] However, finding qualified candidates can be a significant challenge in the data centre sector.[90]

Portugal offers access to a talent pool in engineering, IT, ranking eighth in the EU in the share of tertiary graduates in technical programs (science, mathematics, computing, engineering, manufacturing and construction). There are nearly 230,000 Information Communication and Technology (ICT) specialists in Portugal – i.e., specialists – workers with the ability to develop, operate and maintain ICT systems – comprising 4.5 per cent of the workforce.[91]

> The availability of a skilled workforce is one of the aspects considered by data centre operators, and Portugal is well-positioned compared with other countries in the EU in terms of supply and competencies

Source: CBRE

According to OECD's Going Digital Toolkit statistics, the average share of new university graduates in science, technology, engineering (including ICT fields), and mathematics (STEM) in the total number of new graduates in Portugal is above the OECD average.[92] In 2021 (latest data available), Portugal was the fourth country in the OECD with the highest share of master's graduates in STEM fields (31 per cent), only behind Germany (34 per cent) and Sweden (32 per cent) within the EU.[93] This indicator reflects the availability of human capital in some of the key fields of study that are considered key for a country's success in the digital age, including in the data centre sector.

89 Optrium (2025); How Many People Are Needed to Run a Data Centre?, Available here; Data Center Dynamics (2021), Data centers need to find 300,000 more staff by 2025, Available here.
90 Ascierto, R. & Lawrence,A. (2020); Uptime Institute global data centre survey 2020; p. 24, Available here.
91 Lesniak, O. (2024); Software development in Portugal: hubs, talent, companies, and more, Available here.
92 OECD, OECD Going Digital Toolkit, New tertiary graduates in science, technology, engineering and mathematics as a share of new graduates, Available here.
93 Similarly, Portugal outperformed the OECD average also in the subgroup of bachelor graduates and graduates of short-cycle tertiary education.

> There is a wide, highly recognised engineering talent pool in the country, and Portugal is also considered to be attractive for international talent. We know that data centres need to have highly qualified people. To develop this infrastructure and to operate it, we need to have this talent, and to be attractive to international talent.

Source: Director, Inward Investment, AICEP

Although recognising potential future staffing challenges, experts remain positive about Portugal as a source of talent due to their technical skills and capacity for cultural integration.[94,95] Additionally, Portugal's multilingual workforce provides a competitive advantage in the global data centre sector, enabling seamless communication across markets. The country ranks seventh in the EU and eighth globally in English proficiency for non-native speakers in 2023.[96]

94 IT Insight (2025); "Portugal está no momento certo para investir em data centers", Available here.
95 Nunes, F. (2025); "A IA esta´ perfeitamente ao alcance das PME. Custa menos que um BMW", Available here.
96 EF EPI (2023); EF English Proficiency Index; p. 6., Available here.

CHAPTER 4

THE DATA CENTRE SECTOR IS EXPECTED TO MAKE SUBSTANTIAL CONTRIBUTIONS TO THE PORTUGUESE ECONOMY

Key insights

- The data centre sector's expenditures in constructing and operating data centres can make significant contributions to Portugal's GDP. These expenditures support direct economic effects (value-added from the activities of data centre operators and their contractors), indirect economic effects (value-added from suppliers' increased economic activity), and induced economic effects (value-added from employees' spending throughout the economy).
- Using a macroeconomic model, we find that, between 2022-2024, the data centre sector in Portugal supported **a total GDP contribution of EUR 311 million,** including direct, indirect and induced effects. This contribution reflects significant ripple effects across the economy (also referred to as "multiplier effects"), i.e. how the data centre sector has knock-on impacts on multiple industries including manufacturing, construction, retail trade, transport, accommodation, restaurants, housing and finance.
- The sector's GDP contribution is expected to grow significantly between 2025 and 2030. The estimated benefits will depend on the growth trajectory, which will be influenced by investment conditions.
- Under favourable investment conditions, we find that the sector could support **a total cumulative GDP contribution of up to EUR 26.2 bn between 2025-2030**, considering direct (EUR 9.2 billion), indirect (EUR 8.6 billion) and induced (EUR 8.4 billion) effects. The total of EUR 26.2 billion would correspond to an average economic contribution of EUR 424 per citizen per year (equivalent to 1.3 per cent of GDP per citizen).
- Under less favourable investment conditions, we find that the sector could support a total GDP contribution of EUR 6.7 bn between 2025-2030.
- **Furthermore, we find that the data centre sector can support additional economic impacts**:
  1. *First*, **data centres have broader spillover and enabling effects**. Data centres enable digital technologies like AI, cloud computing, or big data, which can drive innovation and productivity across sectors, further increasing Portugal's GDP and competitiveness.
  2. *Second*, **data centres can drive significant foreign direct investment (FDI)**, both in data centre operations and related activities, fostering clusters along other parts of the digital infrastructure value chain that, in turn, attract other businesses to Portugal.

In this chapter, we use a macroeconomic model to estimate the GDP contribution of the data centre sector in Portugal, based on realised investment expenditures of the sector between 2022 and 2024, and forecasted investment expenditures between 2025 and 2030, for three different growth trajectories of the sector.

The chapter is structured as follows:

- In **section 4.1** we explain the approach, including a description of the economic methodology (section 4.1.1) and describe the key inputs and sources used in our estimation (section 4.1.2).
- In **section 4.2**, we present the results of our estimate of the economic contribution of the sector to GDP between 2022-2024.
- In **section 4.3**, we explain how we model three future scenarios for the development of the data centre sector in Portugal: *stagnation*, *announced investments*, and *expansion* (section 4.3.1), and present the results of our estimates of the economic contribution of the sector to GDP between 2025-2030 in the three different scenarios (section 4.3.2).
- In **section 4.4**, we conclude by reflecting on how the data centre sector may have broader enabling effects in the economy beyond those captured in our macroeconomic model (section 4.4.1) and explain how the sector drives FDI in Portugal and in Europe (section 4.4.2).

4.1 OVERVIEW OF APPROACH TO ESTIMATE ECONOMIC CONTRIBUTIONS

4.1.1 Methodology: Input-output macroeconomic model

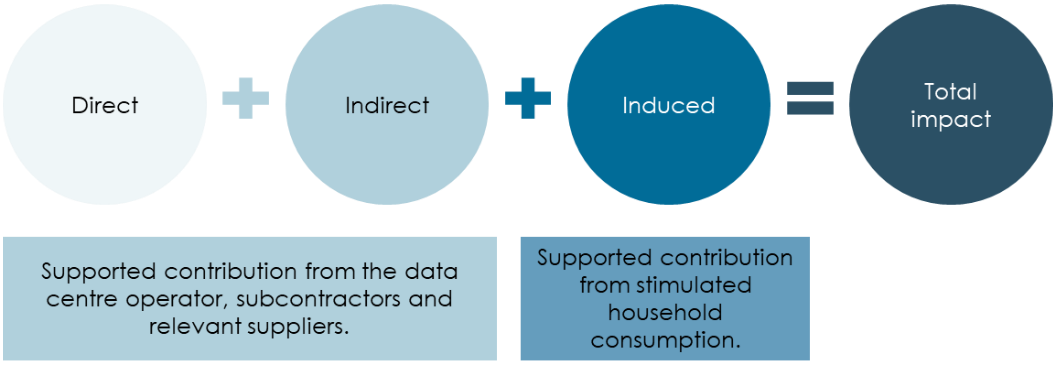
We estimate the economic impact of the data centre sector in Portugal using an economic input-output (IO) model. The IO model is a quantitative method used to analyse the interdependencies between different sectors of an economy and assess how investments in one sector can ripple through the entire economy.

The IO model framework allows us to estimate several ways in which investments support an economic contribution to GDP. In the following, we refer to this as the supported GDP contribution of the data centre sector. The IO framework allows the estimation of direct, indirect and induced effects, as we describe below:

- The **direct effect** includes the economic impact supported (or the value-added) directly by data centres and their key construction contractors.
- The **indirect effect** includes the economic impact on suppliers, which are supported by data centres' purchases of domestic goods and services.
- The **induced effect** refers to the supported economic impact that occurs when employees at data centres and their supplier industries spend their wages throughout the entire economy.

We calculate the total supported GDP and employment contribution as the sum of direct, indirect and induced effects. We note that direct and indirect effects are more clearly attributable to the initial investment itself compared to induced effects which stem from increased household spending, see Figure **12**.

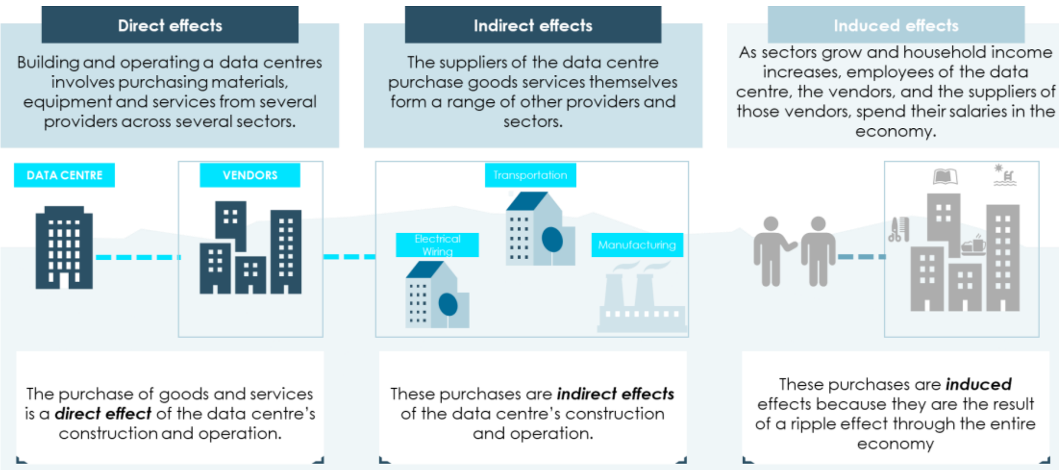
Figure 12
The total estimated impact on GDP includes direct, indirect and induced effects



Source: Copenhagen Economics

The assessment of GDP contributions considers how various sectors and activities are connected with the data centre sector. A core feature of IO modelling is mapping the interdependencies between economic activities. This is crucial because the impact of spending varies by sector – for example, expenditures in construction and electricity affect the economy differently. The IO model tracks how data centres interact with other industries, capturing the flow of spending on infrastructure, energy, equipment, and services throughout the economy. In other words, the model allows us to calculate GDP multipliers which we then use to estimate how the activities associated with data centre investments support the wider economy, see Figure **13**.

Figure 13
Expenditure of data centres have distinct direct, indirect and effects on the Portuguese economy



Note: Stylised illustration of the economic effects of data centres measured in the IO model framework
Source: Copenhagen Economics (based on Capital Link, Available here)

IO models employ several standard assumptions:

First, the IO model is static, implying that there are no constraints on capital or labour, which allows for the expansion of the economy without limitations. As such, IO models work best in estimating the effects of a small part of the economy, such as one firm or one sector. There are also no general equilibrium effects.[97]

Second, an IO model uses average sector numbers (in each country) for inter-sector purchases and the number of jobs. As a result, we assume, as is customary for these types of models, that data centre operators and the relevant suppliers act as average representatives of their sector, as captured in the model.

The IO model does not account for the broader spillover and enabling effects of data centres which drive innovation and productivity across sectors (as discussed in Chapters 1 and 2). These effects are not included in our estimates total of economic contribution supported by data centre sector, which focuses on the immediate impacts (e.g., investments and jobs) and secondary effects on businesses supplying data centres.

4.1.2 Key inputs and sources

Our quantitative estimation of GDP contributions of the data centre sector relies on four core inputs: (i) the overall capacity of the data centre sector (actual and expected, in MW); (ii) the actual and expected expenditure of data centre operators in the construction and operation of data centres

[97] This means that the input-output model considers only the direct, indirect (and induced) linkages between economic sectors, and does not consider broader economy-wide effects, such as potential impacts on price changes or shifts in consumer behaviour.

per MW; (iii) the corresponding distribution per activity; and (iv) the mapping of the interdependencies between different economic activities. See Table **2**.

Table 2
Overview of key inputs

INPUT	HOW IT IS USED	SOURCE
Overall sector capacity (MW) (1)	To allow the estimation of the 'size' of the sector, which supports the estimation of the total expenditures in the data centre sector.	Publicly available information for existing and announced data centres and estimates of potential further investments based on dialogue with sector stakeholders.
Expenditure in construction and operations (EUR/MW) (2)	To estimate the total expenditure of the data centre sector, which supports the estimation of the overall economic contribution.	Sector estimate (for construction)[98]; Start Campus financial data (for operations).
Distribution of expenditure per economic activity involved (3)	To quantify the expenditure that flows into each economic activity, from which different economic contributions will arise.	We use information on Start Campus' cost allocation into subcategories of both construction and operations to allocate it for the rest of the sector.
Interdependencies between economic activities (4)	To determine how much each Euro spent on each economic activity supports the GDP (multipliers) via direct and indirect effects.	OECD, Eurostat

Source: Copenhagen Economics

Overall sector capacity *(input 1)*
Based on public information, qualitatively validated by sector stakeholders, we find that the operational capacity of the sector in Portugal – besides Start Campus – between 2022 and the end of 2024 remained stable at 23 megawatts (MW).[99] At the end of 2024, the initial amount of capacity from Start Campus SIN-01, 14 MW, increased the total capacity of the sector by the end of 2024 to 37 MW.

In our quantitative analysis for the period 2022-2024 we account only for (i) the construction costs related to Start Campus' 14 MW of capacity for SIN-01 that became operational by the end of 2024 and Equinix's 4 MW from LS4 which becomes operational in 2025 and (ii) operational costs for the 23 MW of capacity during 2022-2023 as well as 37 MW in 2024.

For the period 2025-2030, in addition to the 37 MW of operational capacity at the end of 2024, we find that there are publicly announced investments in the pipeline that are expected to add 1,294 MW of capacity announced capacity by 2030 – see Table **3**.

98 Turner & Townsend (2024): Data Centre Cost Index, available (here).
99 Sector reports estimate the capacity in Portugal to have remained stable at 16 MW during 2022-2024, see Colliers (2024): Data Centre Snapshot – Iberian Region, (Available here). We add to this the capacity of Altice's Covilhã data centre (7 MW), which is located outside of Lisbon, see Altice (2021), (Available here) and 14 MW from SIN-01 for 2024.

Table 3
Overview of announced investments until 2030

OPERATOR/DATA CENTRE	CAPACITY (MW)	CONSTRUCTION YEARS	NOTE
Start Campus: SINES DC	1,072[100]	2022-2030	Additional 140 MW (totalling 1.2 GW) in 2031[101]
Edged & Merlin: Lisbon AI Campus	180	2027-2029	Timeline based on publicly announced information.
Atlas Edge: LIS001 & LIS002	8 + 24	2025-2026	Timeline assumed: LIS001 constructed in 2025, and LIS002 in 2026.
Equinix: LS2	4	2024	Facility is expected to become operational in H1 2025, hence we have set 2024 for construction.
Voltekko: Alcochete	6	2025	Timeline assumed: facility announced in 2024.
Total	**1,294**		

Note: Numbers exclude 14 MW of capacity from Start Campus that was operational at the end of 2024 and the operational capacity for the rest of the sector (23 MW) at the end of 2024.
Source: Edged & Merlin: [Link] & [Link]. / Atlas Edge: [Link]. / Equinix: [Link]. / Voltekko: [Link].

As is evident from Table 3 above, Start Campus drives a large share of the total announced capacity investment, corresponding to 83 per cent of all capacity in the pipeline (1,294 MW) until 2030.

We assume that the capacity of each planned data centre becomes gradually available during the construction phase, proportionally to the expected construction time. Accordingly, we distribute the construction and operational expenditure across a set of years.

Beyond the announced investments identified above, our analysis of the future economic contribution of the data centre sector considers different potential growth scenarios. These scenarios, and the corresponding capacity and expenses considered in our modelling, are further detailed in section 4.3.1.

Expenditure of data centre operators and distribution per activity *(inputs 2 and 3)*
The expenditure associated with data centre investments can be distinguished between that related to (i) construction and (ii) operation. Within construction and operation, the expenditure can be further divided into subcategories, which we do to capture the different impacts of the expenditure across sectors – see Box 3.

100 The operational capacity from the SINES DC investment will amount to 1,072 MW by the end of 2030 (excluding 14 MW from SIN-01 already in operation), but an additional 140 MW will become operational in 2031. The operational expenditure in our IO model for the whole sector considers the operation expenditure for 1,086 MW of capacity in 2030 from Start Campus. However, the construction expenditure in our IO model until 2030 also includes the expenditure for the construction of the additional capacity of 140 MW in Start Campus' data centre, which will become ready for service in 2031.
101 Idem.

Box 3 Data centre expenditure is broadly composed of construction and operational costs

Construction expenditures
Construction largely comprises the expenditure related to actual construction work but also includes expenditures on engineering and other technical activities, the purchase of relevant materials and equipment, as well as electricity. Construction expenditure for a data centre ceases when construction is completed and the infrastructure becomes operational. All expenditures thereafter are considered operational costs

We considered the following economic activities associated with the construction of data centres construction (and which are covered by the IO framework): Construction; Professional, scientific and technical activities; Computer, electronic and optical equipment; Electricity, steam and air conditioning supply;[102] Accommodation and food service activities.

As is customary to data centre investments, we include fitout costs under construction. These costs relate to equipping the data centre with the necessary infrastructure, such as power systems and server racks. More precisely, we allocate fitout costs into i) Professional, scientific and technical activities and ii) Computer, electronic and optical equipment.

We do not consider any potential expenditure in Portugal related to the purchase of advanced computing integrated circuits (e.g., semiconductor chips) or equipment installed in data centres by the customers of data centre operators.

Operational expenditures
Operation of a ready-built data centre includes different administrative and support services, other engineering and technical activities, and land costs.

We considered the following economic activities associated with data centre operations (and which are covered by the IO framework): Electricity, gas, steam and air conditioning supply; Repair and installation of machinery and equipment; Administrative and support services; Professional, scientific and technical activities; Accommodation and food service activities; Land costs.

Source: Copenhagen Economics

Based on an external benchmark of data centre construction costs in Europe, we assume a construction expenditure of EUR 8.7 million per MW of capacity.[103] This should be a conservative estimate, as it reflects the lower bound of independent European benchmarks. Additionally, it will remain conservative if, in practice, data centre construction costs are expected to increase at a rate faster than inflation, which has historically been the case. For the construction expenditure related to Start Campus capacity and operational expenditures per MW, we relied on financial information provided by Start Campus.

[102] In practice, some categories may not apply to all data centres, as it depends on how each data centre is set up.
[103] Turner & Townsend (2024): Data Centre Cost Index, Available here. We use the reported CAPEX cost of USD 9.5 million per MW for Lisbon for 2024 and convert it to euros with a USD/EUR exchange rate of 0.92. This results in a CAPEX cost of EUR 8.7 million per MW.

In addition to the level of expenditure, we relied on Start Campus' financial information to estimate (i) how the expenditure in data centres is divided across related economic activities (identified in Box 3) and (ii) how much of it is spent on services and goods provided in Portugal.[104] Both elements are considered in our assessment to foster the accuracy of our estimates of the economic contribution of the expenditures to Portuguese GDP.

Mapping of the interdependencies between different economic activities *(input 4)*
We rely on the internationally established framework from the OECD and Eurostat data to calibrate the model to capture specific features of the Portuguese economy.[105] We use OECD's[106] latest IO table for Portugal in OECD's database (i.e., for 2019, excluding the table for 2020 as it reflects the impact of Covid-19 pandemic across the economy) and extrapolate it to the years 2022-2030 based on the forecasted change in Portugal's GDP and labour force during this period.[107] For the calculation of induced effects, we estimated wages based on data from Eurostat[108] (2019) and the value-added for each sector in the 2019 IO table.

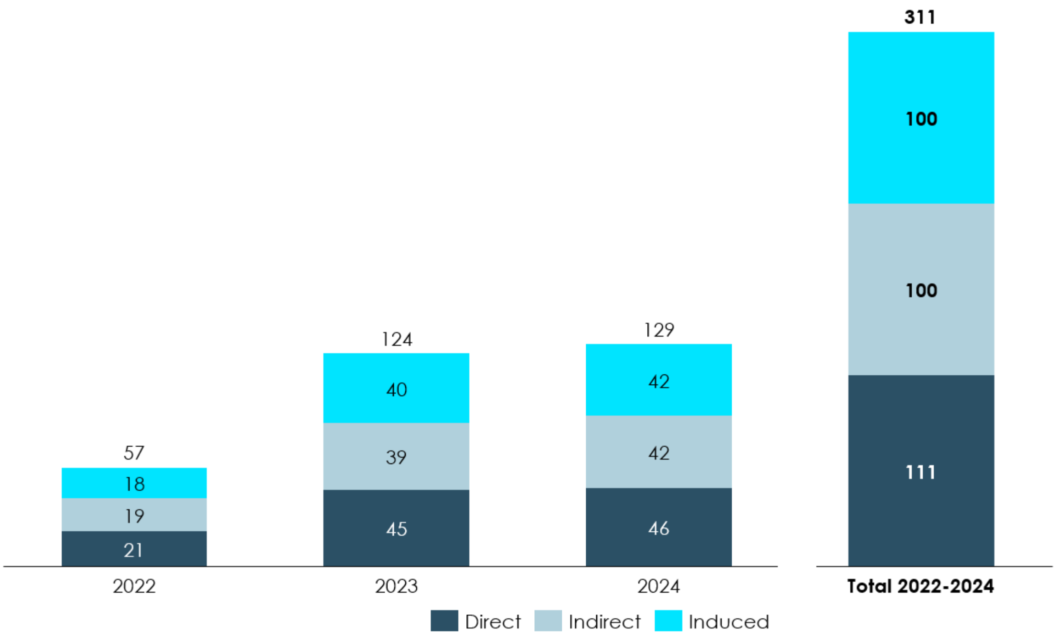
4.2 THE SECTOR SUPPORTED A TOTAL GDP CONTRIBUTION OF EUR 311 MILLION BETWEEN 2022-2024

We find that 23 MW of capacity have been operational in Portugal for the sector as a whole during 2022-2023, and 37MW in 2024 from the addition of the first part of capacity (14 MW) from SIN-01. Our input data for 2022-2024 also covers construction expenditure for two data centres: the construction of Start Campus' SIN-01 facility during 2022-2024 and Equinix's LS2 during 2024.

In total, summing across the economic contribution supported by both construction and operations expenditures, the sector supported a GDP contribution of EUR 129 million in 2024 and of EUR 311 million cumulatively during 2022-2024, considering direct, indirect and induced effects, see Figure **14**.

[104] Start Campus was responsible for the computations and provided Copenhagen Economics with the processed data prepared for this finality, with Copenhagen Economics providing generic guidance.
[105] Based on the 2019 IO table for Portugal in the OECD's database, which we extrapolate to the years between 2022-2030.
[106] OECD (2025), (Available here).
[107] Note that based on the matrix calculation that returns the GDP multipliers, they are the same for all years 2022-2030. Employment multipliers vary slightly by each year as the matrix calculation differs from the GDP one.
[108] Eurostat/FIGARO (2025), (Available here).

Figure 14
The Portuguese data centre sector GDP contribution amounted to EUR 311 million in 2022-2024
EUR millions



Note: GDP contribution supported by the Portuguese data centre sector, 2024. The total includes the supported contribution from direct, indirect and induced effects.
Source: Copenhagen Economics based on data provided by Start Campus and publicly available information on the capacity of other existing and upcoming data centres in Portugal.

The total supported GDP contribution of EUR 129 million stems from multiplying the sector's expenditure in the respective subcategories of construction and operation with separate GDP multipliers for the direct, indirect and induced effects. The supported contributions within these subcategories are added together for the total supported contribution in construction and operations.

In 2024, the supported GDP contribution from direct and indirect effects amounted to EUR 88 million in 2024. Above and beyond direct and indirect effects, the investments are likely to trigger ripple effects in the economy. We estimate these additional, induced effects to have amounted to EUR 42 million in 2024.

4.3 THE SECTOR IS ESTIMATED TO SUPPORT A TOTAL CUMULATIVE GDP CONTRIBUTION OF EUR 6.1-26.2 BILLION BETWEEN 2025-2030

4.3.1 We model three potential scenarios for future sector investments

The data centre sector is evolving rapidly. Demand for data centres is expected to increase in coming years due in particular to the projected growth in demand for AI-related services. However, various factors make it difficult to predict future investment levels exactly:

- The speed of uptake of AI solutions and the associated demand for data centre capacity;
- Interest rates and the macroeconomy as a whole;
- Regulation and financial incentives to support investment in Portugal;
- Policy that could affect Portugal's ability to attract investment, e.g., international restrictions on trade of advanced semiconductor technologies, especially AI-grade semiconductor chips, may reduce the ability or incentive of data centre operators to invest in Portugal;
- Whether there are favourable conditions in other countries where data centres could also be constructed, e.g. Spain and "FLAP"[109]-countries but also other rapidly evolving cities in other countries, such as Milan, Oslo and Helsinki.

To account for inherent uncertainty regarding the investment levels of the total sector for the period 2025-2030, we consider three scenarios: (i) ***stagnation*** scenario; (ii) ***announced investments*** scenario; and (iii) ***expansion*** scenario:

- ***Stagnation scenario:*** assumes that investment conditions are unfavourable (e.g., due to regulatory constraints on large-scale data centre investments and related challenges, or restrictions on access to advanced AI-grade semiconductors), leading operators to delay or cancel planned expansions of capacity until 2030. We model this scenario assuming (i) the existing capacity of 37MW remains operational; (ii) 43 per cent of the publicly announced upcoming capacity (554 MW out of 1,294 MW) is developed during 2025-2030, see Section 4.1.2. Specifically, we consider only the construction and operation of SIN01, SIN02 and SIN03 from Start Campus (412MW in total excluding 14 MW already live from SIN01), 100 MW for Equinix's Lisbon facility, and the other investments by their full announced capacity (42 MW).[110]
- ***Announced investments scenario:*** assumes the existing capacity of 37MW and all of the planned capacity from Start Campus – excluding 14 MW that is already operational – and all other operators (1,072 + 222 MW) which has been publicly announced, and which is scheduled to materialise by 2030, see Table 3 section 4.1.2.
- ***Expansion scenario:*** assumes on top of the announced investments scenario that Portugal will attract additional investment from new players and that existing players will make extensions to their announced investments. These increase the upcoming capacity by

[109] The FLAP countries — Frankfurt, London, Amsterdam, and Paris — are Europe's key data centre hubs.

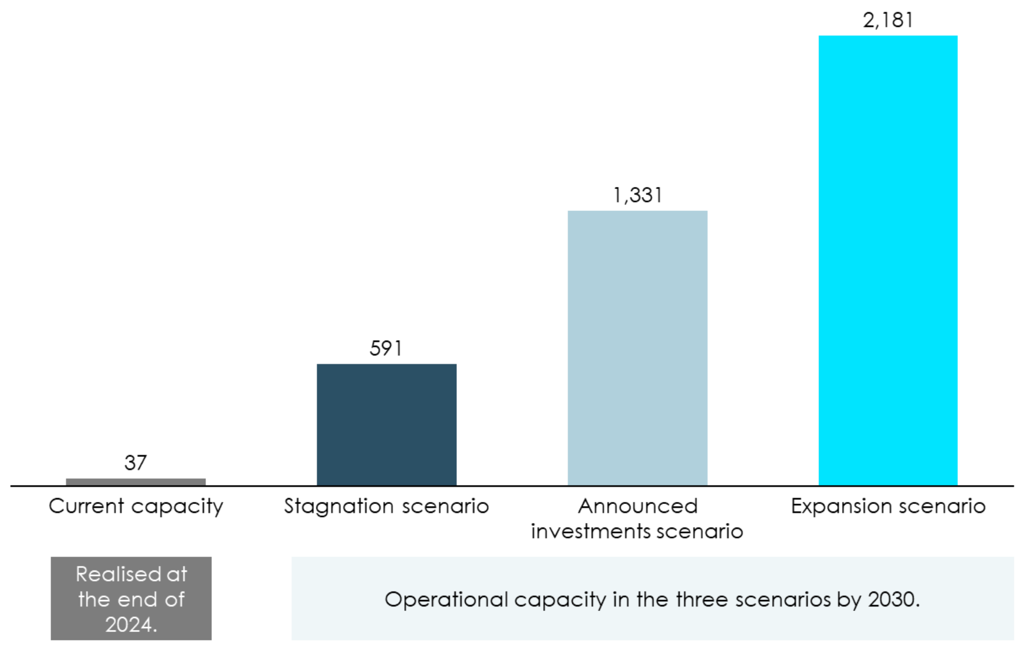
[110] In the remainder of this document, we refer to the different buildings of Start Campus' data centre in Sines, Alentejo, as SIN01-SIN07. Currently, SIN01 is in operation while the remaining buildings are planned. Total capacity varies between buildings.

a further 850 MW from 1,331 MW to 2,181 MW in total compared to the announced investments scenario.

Similar to section 4.2, we convert these capacity estimates for upcoming capacity into construction and operations expenditure based on a reference cost metric for construction from Turner & Townsend (2024) and estimates informed by Start Campus' data.[111]

By adding up Start Campus' expenditure for the SINES DC investment and the capacity-based expenditure of the remaining sector in these scenarios, we provide three estimates of the supported economic contribution of the Portuguese data centre sector between 2025-2030. For an overview of the total upcoming capacity in these three scenarios, see Figure **15**.

Figure 15
Current and upcoming capacities in the three forward-looking scenarios
MW



Note: Figure includes 1,072 MW of capacity from Start Campus' SINES DC in the announced investments and expansion scenario. For the purposes of calculation of investment expenditure, we consider Start Campus's planned total capacity of 1.2 GW (i.e., we consider the additional 140 MW part of the total project, as this capacity will be built until the end of 2030, albeit entering into operation only in 2030)

Source: Copenhagen Economics based on publicly announced information on capacity in the pipeline and an estimate of the market's potential based on two higher-bound estimates. Sector stakeholders from Portugal have communicated to us the two latter estimates, i.e., the market's potential.

Below, we describe each of the three scenarios in more detail.

[111] Turner & Townsend (2024): Data Centre Cost Index, Available here.

Stagnation scenario

In the stagnation scenario, we assume that 57 per cent of the publicly announced, upcoming capacity (740MW out of 1,294 MW) by March 2025 will not materialise by 2030. This can be due to either delays of the given projects beyond 2030 or their cancellation.

Primarily, this scenario considers that due to regulatory constraints on large-scale data centre investments and related challenges, existing operators may not be able to, or decide not to, fully proceed with the planned, annual expansions of capacity until 2030. A data centre investment requires bureaucratic and administrative coordination with local authorities along several dimensions, which can include the securing of land, access to the power grid and satisfying different energy consumption, efficiency and other criteria. Delays or abrupt developments in these procedures can halt the development plans for the investment for several years.

For Portugal, it is also vital that the objectives of policymakers are in line with the projected expansions of data centre operators. An increase of capacity from 37 MW at the end of 2024 to even 591 MW in this "stagnation" scenario by 2030 is substantial in size. Its materialisation requires coordination at the national level of e.g., the required grid capacity, supporting energy infrastructure and related regulatory procedures for support. We assess identified challenges along these dimensions for Portugal in more depth in section 6.

Evidence from other European markets suggests that regulatory constraints and challenges that lead to delays and/or cancellations of data centre investments are not uncommon, see Table **4**.

Table 4
Other data centre operators have delayed or cancelled investments in Europe due to power grid constraints and regulatory complications

OPERATOR	DATA CENTRE LOCATION	REASON FOR DELAY OR CANCELLATION
Apple	Athenry, Ireland	Apple received planning permission for the facility in 2016 but local opposition against the data centre and related legal challenges as well as administrative delays led Apple to delay and ultimately cancel the investment in 2018.
Google	Bissen, Luxembourg	The data centre has been constantly delayed since 2016 due to a combination of bureaucratic and administrative delays, environmental aspects and political changes. The future of the facility remains uncertain.
Meta	Zeewolde, Netherlands	After initially receiving approval from the Zeewolde council in 2021, Meta cancelled its planned data centre in 2022 due to the Dutch state halting to sale of a share of the earmarked land for the facility.

Source: Apple: see e.g., Guardian (2018), available (here) & Data Centre Dynamics (2022), available (here).
Google: see e.g., Delano (2025), available (here) & RTL (2024), available (here).
Meta: see e.g., Data Centre Dynamics (2022), available (here) & NL Times (2023), available (here).

Beyond regulatory constraints, the general macroeconomic climate and the demand for AI solutions will also influence the investment conditions around data centres. First, data centre investments have significant capital expenditure (CAPEX) costs. A drastic increase in interest rates may result in delaying an investment or parts of it to an economically more feasible period. Second, a slowdown in the demand for AI solutions compared to their projected level may reduce the demand for computing power from its estimated amount today. Furthermore, improvements in the computing power of AI-ready data centres may reduce the demand for the general level of capacity in the future, even if the demand for AI solutions were to increase.

Overall, this scenario considers Portugal not to be able to take a leading position as a European data centre hub by 2030. Additional investment, for which Portugal may otherwise be able to compete, could instead flow to other European countries.

Of the announced capacity by March 2025, we consider the materialisation of the SIN01, SIN02 and SIN03 facilities by Start Campus by 2030, with the construction of SIN04, SIN05 and SIN06 being delayed beyond 2030, or cancelled (for a definite or indefinite period). The upcoming capacity from SIN01-SIN03 amounts to 412 MW, excluding 14 MW that is already live from SIN01.[112] Similarly, we consider that, contrary to the 180 MW of planned capacity from Edged & Merlin's Lisbon AI Campus, only 100 MW will materialise by 2030.[113] We consider fully the other announced investments, which are smaller by their capacity. Together, these remaining three investments amount to 42 MW.

In our input-output model, we thus consider the construction costs associated with (i) of SIN01, SIN02 and SIN03 for Start Campus (taking place during 2022-2029), and (ii) the construction of other operators' data centres, including 100 MW for Edged & Merlin (taking place during 2025-2027). We account for the operational expenditure that corresponds with the delivery timeline in this scenario. In this scenario, the delivery timeline is extended – i.e., less investment materialised between 2025-2030 – compared to the announced investment scenario, which we describe in the following paragraphs.

Announced investments scenario

We estimate the announced investments scenario based on the total upcoming capacity that has been publicly announced by March 2025. In addition to 1,072 MW from Start Campus' SINES DC facilities, this includes the announced 180 MW from Edged & Merlin, and a total of 42 MW of announced capacity from Atlas Edge, Equinix and Voltekko. Effectively, this scenario considers Portugal to strengthen its competitive position as a European data centre hub.

Contrary to the stagnation scenario, our announced investments scenario assumes that there are no delays or cancellations in the announced investments. Further, this scenario omits any likely investments that will be made during 2025-2030 but which have not yet been announced or decided on.

In this scenario, the total operational capacity for the sector amounts to 1,331 MW in 2030. This is an increase of 740 MW compared to the stagnation scenario. The capacity of 1,331 MW includes the

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112 This scenario assumes the following phasing of the upcoming 412 MW of capacity to be added by Start Campus: 12 MW operational by the end of 2026, 180 by the end of 2027 and 220 by the end of 2029.

113 This 100 MW for Edged & Merlin would in effect only cover the Phase 2 of the LIS-VFX investment, with no upsizing at all up to 180 MW as announced or beyond to 300 MW. For more, see Merlin Properties (2025): FY2024 Results Presentation, available (here).

37 MW of capacity that was operational at the end of 2024, but excludes the additional capacity of approx. 140 MW from the SINES DC, which will become operational only in 2031 [114]

Expansion scenario

In our expansion scenario, we add an estimate of new entrants as well as extensions to current investments to the announced investments scenario This scenario provides our highest estimate for upcoming capacity and serves as a proxy to reflect the potential of the Portuguese data centre market to attract investments from new operators as well as for existing operators to expand. Effectively, this scenario considers Portugal to take a leading position as European data centre hub. We base this scenario on potential capacity estimates and additional investments that sector stakeholders have communicated to us.

First, this scenario assumes the construction of two data centres during 2027-2029 by new operators in the market. Both data centres provide an additional capacity of 180 MW and are thus equal in size to the announced capacity of Edged & Merlin's Lisbon AI Campus. We assume that this additional capacity of 360 MW becomes operational during 2028-2030, evenly distributed.

Second, we consider extensions to current investments that have the potential to increase the market's capacity by 490 MW in total. This includes the announced plan of Edged & Merlin to expand the Lisbon AI Campus to 300 MW. In our calculations, we assume that the construction of the extended Lisbon AI Campus will take place during 2025-2029, as per the original schedule for 180 MW. We assume the additional capacity of 120 MW to become operational in 2030, with 180 MW becoming operational during the preceding three years.

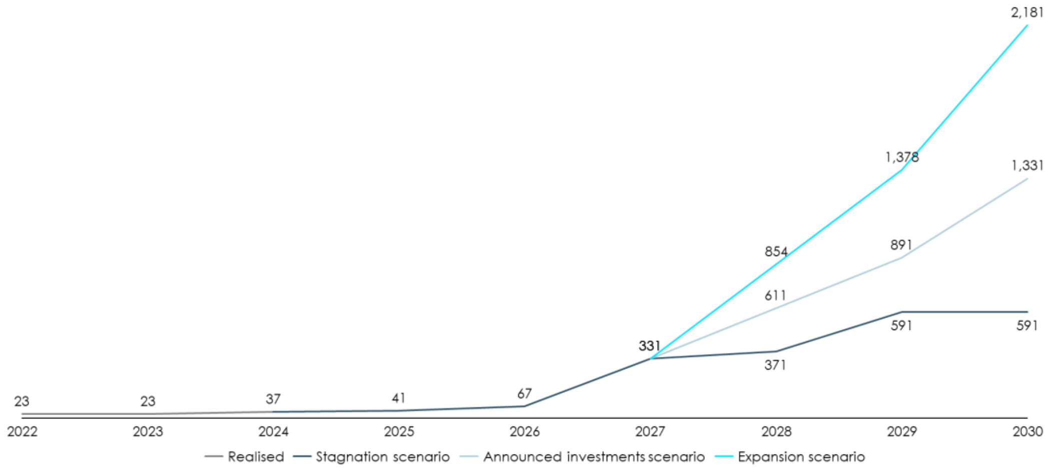
Further, sector stakeholders in Portugal have communicated to us other potential extensions to existing data centres. Besides the additional 120 MW from Edged & Merlin, these remaining extensions amount to 370 MW. We distribute the construction of this remaining 370 MW across the years 2027-2029, so that the capacity becomes operational by 2030, evenly distributed.

In total, the capacity from new investors (360 MW) and potential extensions (490 MW) increases the capacity by 2030 from 1,331 MW in the announced investments scenario to 2,181. Further, this is an increase of 1,590 MW to the stagnation scenario.

For an overview of the annual upcoming capacity in each of the three scenarios, including 37 MW from 2024, see Figure **16**.

[114] The operational capacity from the SINES DC investment will amount to 1,086 MW by the end of 2030. The operational expenditure in our IO model for the whole sector considers the operation expenditure for this amount of capacity in 2030 from Start Campus. However, the construction expenditure in our IO model for 2030 accounts also for construction of the additional capacity from the SINES DC investment, which will become live in 2031.

Figure 16
Annual operational capacity until 2024 and during 2025-2030 in the three forward-looking scenarios
MW



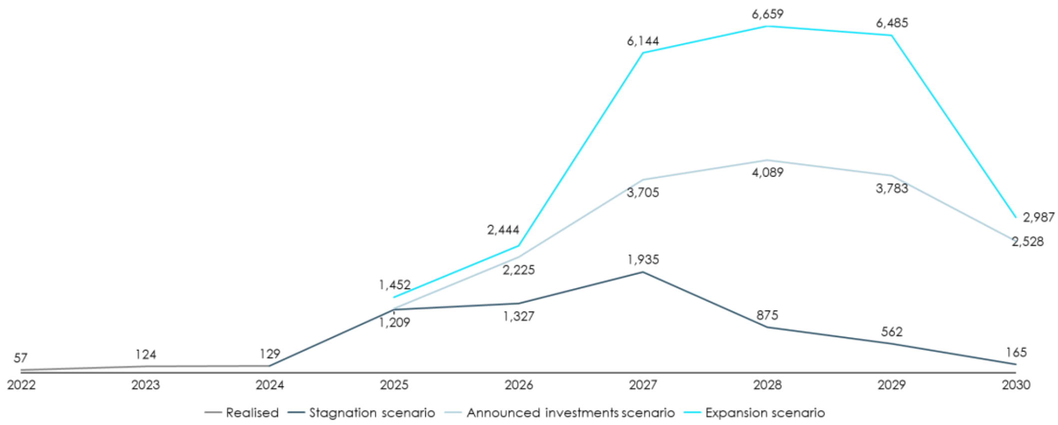
Note: Figure includes 1,086 MW of capacity from Start Campus' SINES DC in the announced investments and expansion scenario (until 2030) and the current capacity of 37MW together with the upcoming capacities in the forward-looking scenarios.
Source: Copenhagen Economics based on our estimate of three scenarios for upcoming capacity in the Portuguese data centre sector.

In the three scenarios, the annual operational capacity for the sector remains unchanged during 2025-2027. From 2027 onwards, the capacity estimates diverge into three distinct paths as the different extents of capacities under construction start to become operational.

4.3.2 More favourable investment conditions could support a total cumulative GDP contribution of up to EUR 26.2 bn between 2025-2030

We calculate the total impact of the sector as the sum of direct, indirect and induced effects. The total supported contributions start to increase substantially from 2025 onwards in all three scenarios, see Figure **17**.

Figure 17
Total GDP contribution supported by the Portuguese data centre sector, 2022-2030
EUR millions



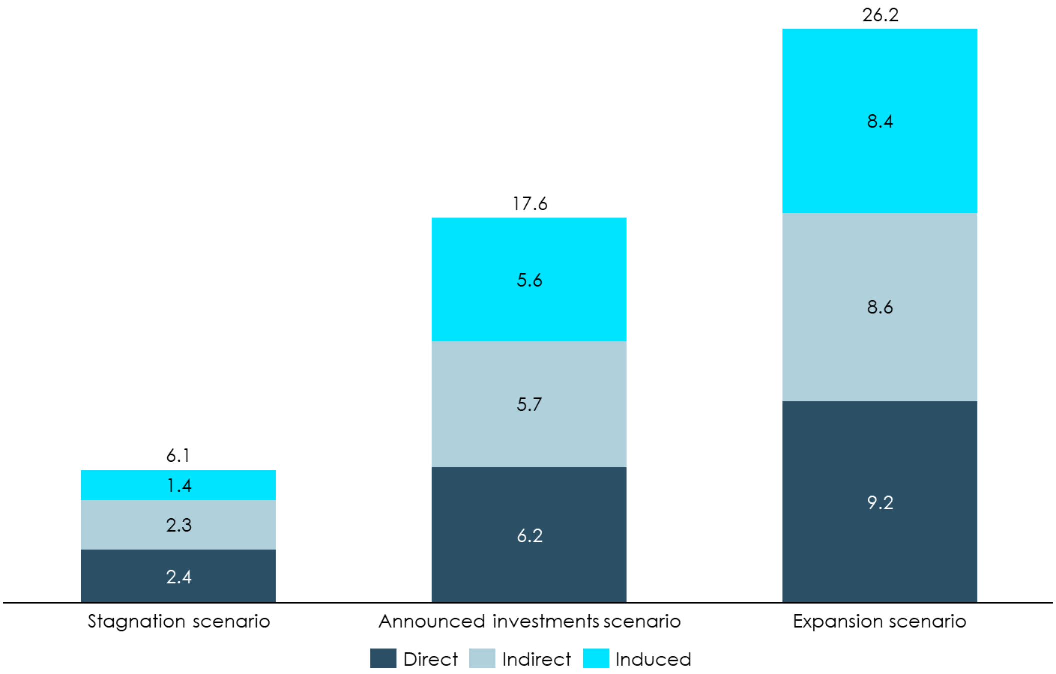
Note: The figure includes the direct, indirect and induced effects for both construction and operations until 2024 and for the three scenarios that depict the different levels of potential capacity in the sector during 2025-2030.
Source: Copenhagen Economics, based on data provided by Start Campus and publicly available information on the capacity of other existing and upcoming data centres in Portugal.

We estimate that the annually supported GDP contributions increase from below EUR 150 million during 2022-2024 to above EUR 1 billion already in 2025 considering direct, indirect and induced effects. The busiest construction years comprise 2027-2029, during which the supported GDP contributions peak in the announced investments and expansion scenarios.

We estimate the sector's average supported contribution during 2025-2030 to range between EUR 1.0 billion in the stagnation scenario to EUR 4.4 billion in the expansion scenario. Of these EUR 4.4 billion in the expansion scenario, we estimate the share of direct and indirect effects to amount to EUR 3.0 billion on average during 2025-2030. In addition, we estimate that the induced effects amount to EUR 1.4 billion.

We estimate the total, cumulative supported GDP contribution between 2025-2030 to range between EUR 6.1 and EUR 26.2 billion in the three scenarios, considering direct, indirect and induced effects see Figure **18**.

Figure 18
Total supported GDP contribution during 2025-2030
EUR billions



Note: The figure includes the direct, indirect and induced effects for both construction and operations for the period 2025-2030 in the three different scenarios.
Source: Copenhagen Economics, based on data provided by Start Campus and publicly available information on the capacity of other existing and upcoming data centres in Portugal.

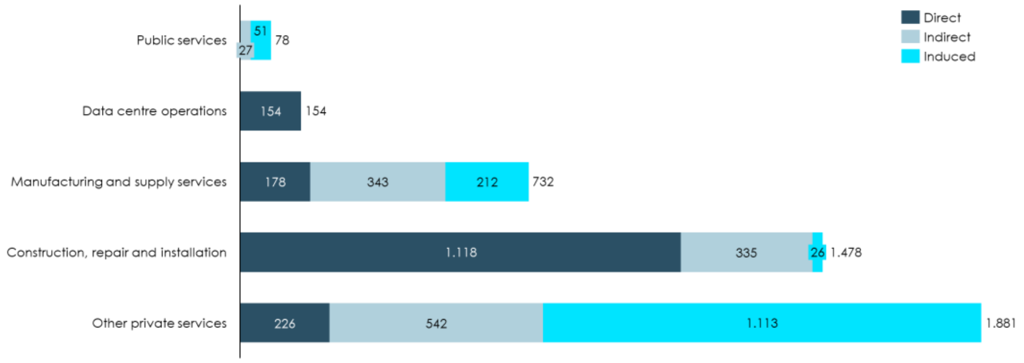
We estimate the total cumulative contribution arising from both direct and indirect effects to range between EUR 4.7 billion and EUR 17.8 billion.[115] In addition, we estimate that the total cumulative induced effects in the three scenarios ranges from EUR 1.4 billion to EUR 8.4 billion. These effects, though more challenging to attribute causally to data centres, represent the additional economic activity that could be generated by increased household spending.

The share of the total cumulative impact during 2025-2030 that is due to construction (and not operations) is relatively stable across the three scenarios, at 89 per cent (EUR 5.4 billion) in the stagnation scenario and at 90 per cent (EUR 23.5 billion) in the expansion scenario.

With our IO model and our input data for the data centre sector, we can assess to which sectors the supported GDP contributions from the data centre activity in construction and operations flow. We find that this activity supports a direct and indirect contribution to the Portuguese GDP mainly in private services (EUR 768 million per year), construction (EUR 1.5 billion per year) and manufacturing (EUR 521 million per year) sectors, between 2025-2030, see Figure **19**.

[115] In the expansion scenario, the total cumulative supported GDP contribution from direct and indirect effects amounts to EUR 9.2 and EUR 8.6 billion, respectively.

Figure 19
GDP contributions across the economy – Expansion scenario
Average per year for 2025-2030, EUR millions



Note: 'Other private services' include (but are not limited to) retail trade, transport, hotels and restaurants, real estate, and legal, accounting and employment activities. Contrary to other employment figures and supported contributions in this report, we calculate those for this figure with an alternative IO matrix calculation. As a result of the structure of our input data, this methodology underestimates the total effect by 1 per cent.
Source: Copenhagen Economics based on data provided by Start Campus and publicly available information on the capacity of other existing and upcoming data centres in Portugal.

In addition, GDP contribution arising from increased household consumption (induced effects), amounting to EUR 1.1 billion per year on average, flows largely to private services sectors, including retail trade, transport, hotels and restaurants, real estate, and legal, accounting and employment activities.

4.4 THE GROWTH OF THE DATA CENTRE SECTOR HAS ADDITIONAL ECONOMIC IMPACTS

In addition to the direct, indirect and induced economic effects driving the economic contributions estimated in the previous sections, the data centre sector's investments can further support the economy by (i) enabling the innovation and economic benefits brought about by AI and other digital technologies, and triggering further investments in adjacent sectors of the digital ecosystem; and (ii) supporting significant foreign direct investment (FDI). We reflect on these sources of additional economic benefits in the following sections.

4.4.1 Enabling effect across the economy

Data centres can have broader spillover and enabling effects that our IO model does not account for: (i) enabling AI and digital transformation, (ii) supporting the start-up ecosystem, (iii) supporting local suppliers, and (iv) supporting adjacent sectors/investments in infrastructure, see Box 4.

Box 4 The different economic effects captured and not captured by our IO model

Economic effects that are captured by our IO model:
As explained in section 4.1, we estimate the economic contributions of the data centre sector using an IO model that considers the expenditure involved in the construction and operation of data centres and how that expenditure produces ripple effects throughout the economy, covering:

- *Direct effects* – the economic impact supported (or the value-added) directly by data centre operators and their key contractors for the construction and operation of data centres, including fit-out activities that data centre customers engage in.
- *Indirect effects* – the economic impact on suppliers of data centre operators, which are supported by data centres' purchases of domestic goods and services in the construction and operation of data centres. In other words, the added value results from data centres' direct suppliers having to procure additional inputs (e.g., labour and materials) from their own suppliers.
- *Induced effects* – the supported economic impact that occurs when employees at data centres and their supplier industries spend their wages throughout the entire economy.

Economic effects that are not captured by our IO model
The IO model does not capture broader spillover and enabling effects, or the economic contributions of expenditures in adjacent sectors, such as subsea cables, energy infrastructure, etc. – other than the economic contribution in those adjacent sectors that results directly from data centre sector expenditures. Accordingly, the following economic effects are above and beyond the IO model:

- *Enabling AI and digital transformation* – how data centres contribute to enabling digital technologies like AI, cloud computing, or big data, which drive innovation and productivity across sectors.
- *Supporting the start-up ecosystem* – how data centres can foster the development of the startup ecosystem, contributing to the attraction of startups and strengthening Portugal's broader digital cluster, with positive spillovers in terms of innovation and employment.
- *Supporting local suppliers* – how local suppliers can leverage additional experience, qualifications and references in working with local data centres to become more competitive in other markets.
- *Supporting adjacent sectors/investments in infrastructure* – how data centres may reinforce the business case or spark synergies which lead to additional infrastructure investments in related sectors in Portugal, e.g., in electricity grid development, renewable energy generation or subsea cables.

Source: Copenhagen Economics

First, as discussed in Chapters 1 and 2, data centres contribute to enabling digital technologies like AI, cloud computing, or big data, which drive innovation and productivity across sectors. These effects contribute to economic growth. However, the "special nature" of the data centre sector in supporting this kind of economic growth is not captured in the macroeconomic model, which focuses on the more immediate and directly attributable economic contribution associated with constructing and operating data centres.

Existing literature suggests that the broader economic benefits enabled in part by the data centre sector may far exceed the impacts captured in the model. As discussed in Chapter 2, research suggests that widespread AI adoption could drive a 7 per cent increase in annual global GDP over the coming 10 years – with even greater potential in European economies such as Portugal. As described by one data centre operator, the main value of data centres may lie in their role as enablers of innovation.

> While the construction of data centres can contribute significantly to GDP and support many jobs, their main source of value lies in their role as enablers of research and innovation that will unlock productivity gains, new services, and new artificial intelligence models. Data centres are truly the fertilisers of innovation.

Source: Managing Director for Portugal, Equinix

Access to computing power capable of dealing with AI workloads enables AI adoption and can foster the development of new AI models by businesses and other institutions. In the interviews we conducted with sector experts and policy experts, the importance of data centres as drivers of further development and innovation was highlighted.

> Computing is a critical input for the adoption and development of technological and AI solutions, both in the context of a business/enterprise and in an academic research context.

Source: Professor Doutor Arlindo Oliveira

A growing data centre sector in Portugal can foster access to computing capacity and its quality. Data centre investments have the potential to facilitate the adoption of more advanced technological solutions and models in various sectors, as highlighted by Professor Arlindo Oliveira in our interview. As another interviewee put it, this allows the Portuguese economy to further move away from traditional industries towards increased know-how in emerging, more advanced ones.[116]

[116] Our interview with Eduardo Bandeira from Escola Tecnológica do Litoral Alentejano in Portugal.

Second, the development of the sector can be particularly beneficial for Portugal's rapidly expanding tech start-up and data ecosystem, especially in Lisbon, which has been recognised by the growth of its tech sector and ability to attract startups and foreign businesses (e.g., through initiatives like the Unicorn Factory Lisboa). Lisbon was recognised (i) as the European Capital of Innovation by the European Union in 2023, by the European Commission;[117] and (ii) as one of the top 10 startup hubs in Europe in 2024, according to the Financial Times;[118] which exemplifies the city's dynamic innovation landscape. Enhanced digital infrastructure, such as robust data centres, can serve as a critical foundation for these ecosystems to scale, innovate, and compete globally.

> The development of the data centre sector contributes to the broader development of the digital economy. As the country's digital infrastructure develops, Portugal becomes more attractive for researchers

Source: João Nuno Ferreira, Foundation for National Scientific Computation (FCCN/FCT)

Third, data centre investment also increases the competitiveness of local suppliers, as they contribute to the construction and operation of upcoming data centres. Portugal already possesses skilled suppliers in various sectors, such as construction and installation, as well as in technical and engineering activities, which data centre operators may use in their investments instead of resorting to foreign suppliers.

Participating in upcoming, large data centre investments allows these suppliers to deepen their expertise in the sector and thus potentially also expand their ability to plan and conduct different projects in general, as highlighted to us by Professor Arlindo Oliveira. In the longer term, this channel may also facilitate the internationalisation of these supply businesses, if it allows them to export their goods and services.

> The implementation of data centre investments can significantly contribute to the competitiveness of local businesses that supply goods and services to data centres.

Source: Professor Doutor Arlindo Oliveira

Fourth, the expansion of Portugal's data centre sector may also strengthen the case for further infrastructure investment in adjacent sectors. For example, as the country becomes more relevant as a regional data and connectivity hub, its ability to attract additional projects, such as new subsea

117 European Commission (2023), The European Capital of Innovation Awards (iCapital) 2023: the winners, Available here.
118 See Financial Times' Europe's Leading Start-up Hubs 2024 ranking, Available here. Lisbon-based initiative Unicorn Factory Lisboa was ranked 10th in the ranking comprising 125 hubs.

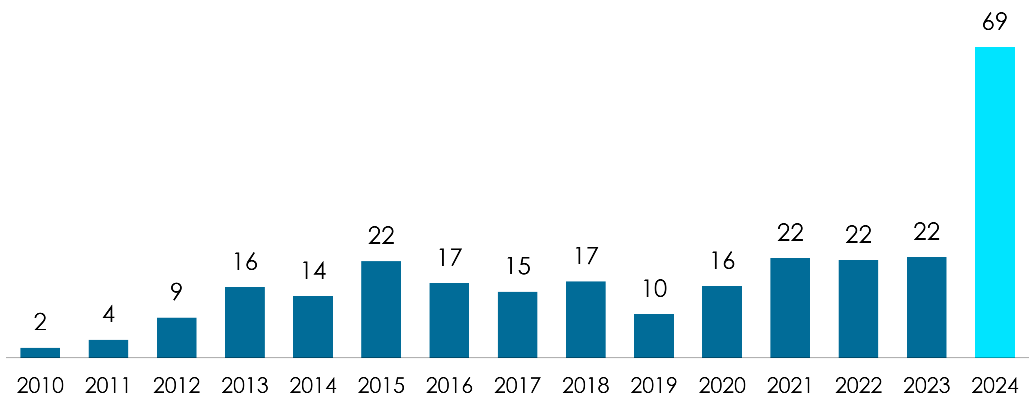
cable landings, may be reinforced. Similarly, the increased energy demands of data centres could encourage updates to the national electricity grid and the development of nearby power generation facilities, fostering further economic and industrial activity and enhancing Portugal's overall digital infrastructure.[119]

4.4.2 Contribution to driving FDI

Foreign direct investment (FDI) in Portugal reached a record EUR 13.2 billion in 2024 according to AICEP, a 19 per cent increase compared to 2023. The data centre sector can potentially contribute to sustaining and amplifying this momentum.[120]

The data centre sector plays a significant role in attracting FDI. According to recent estimates, in the first three quarters of 2024, an estimated USD 106 billion in greenfield FDI was committed to data centres globally.[121] In Europe, announced FDI in greenfield data centres tripled during 2024, exceeding USD 69 billion, see Figure **20**.[122]

Figure 20
Announced FDI in greenfield data centre investments tripled in Europe during 2024
USD billion



Note: Growth of FDI in greenfield data centre investments in Europe
Source: fDi Markets

An increasing share of FDI into data centres is flowing to emerging markets, like Portugal. Market intelligence analysis shows a growing trend in data centre FDI moving beyond traditional hubs like

[119] Data centres can trigger significant infrastructure investments (and growth) across related sectors. For example, investments in electricity production, transmission and distribution, thus potentially further contributing to the economic development and the implementation of new infrastructures at the regional level – i.e., in less densely populated areas compared to the capital region. See e.g., McKinsey (2024), How data centers and the energy sector can sate AI's hunger for power, Available here.

[120] AICEP (2025), FDI in Portugal rose 19% in 2024 13.2 billion euros, Available here.

[121] fDi Markets (2025), Record data centre investment spreads to secondary markets, Available here. (Accessed: 14 March 2025)

[122] fDi Intelligence (2025), European Cities and Regions of the Future 2025, Available here. (Accessed: 14 March 2025)

the FLAP-D[123]. According to fDi Intelligence, between 2010-2023, the FLAP markets consistently made up at least 20 per cent of Europe's annual data centre FDI. However, in the first three quarters of 2024, they accounted for less than 10 per cent of announced greenfield data centre FDI across Europe.[124]

In Portugal, foreign investment accounts for most existing and planned data centre capacity. Several foreign companies are driving the development of upcoming data centres in Portugal. Most of the data centre investments in Portugal are led by US-headquartered/US-based companies holding majority stakes in the main data centre players in the country.[125]

The data centre sector also contributes to increasing FDI by fostering clusters along other parts of the digital infrastructure value chain that, in turn, attract other businesses that decide to invest in Portugal due to a growing data centre sector.[126] This includes suppliers but also businesses, particularly technology firms, which benefit from proximity to a data centre. Proximity to data centres can decrease both latency and transport costs.

> The presence of advanced data centers can encourage technology companies to invest in the region, bringing cutting-edge technology and expertise, creating a tech ecosystem that attracts further foreign investment.

Source: Director of Marketing, Communications & Brand, Global Business Units, Jacobs

In our interview with CTS Group's Senior VP for Business Development (EMEA), Eduard Pacuku highlighted the close collaboration which a data centre investment creates between its operator and various suppliers. This supports FDI in the longer term. CTS Group, one of the largest data centre developers in Europe, has in recent years increased its presence in Portugal by also collaborating with other businesses and subcontractors in similar projects.[127] In February 2025, CTS Group relocated its European headquarters to Lisbon.[128]

123 Frankfurt, London, Amsterdam, Paris, and Dublin.
124 fDi Markets (2025), Record data centre investment spreads to secondary markets, Available here. (Accessed: 14 March 2025)
125 This includes investments from businesses either based abroad or backed by international partners (e.g., Edged Energy, Merlin Properties, Equinix, Atlas Edge and Start Campus). In Portugal, Edged Energy (Edged) and Merlin Properties have joint-venture operations. Edged is backed by US-based infrastructure company Endeavour; Equinix is a US-based publicly traded company; Atlas Edge is owned by US-based company Digital Bridge and Liberty Global; Start Campus is backed by Davidson Kempner Capital Management (majority owner, based in the US) and Pioneer Point Partners (based in the UK).
126 See also Eco (2025): Microsoft would be "immensely pleased" to construct a 'data centre' in Portugal. Available here.
127 Devs (2025): CTS Group Expands Operations in Portugal and Partners with Mecwide for Major TikTok Project, Available here.
128 CTS Group (2025), Available here.

> The growth of the data centre sector led us to create a strong presence in Portugal. We have created local teams, with local people and invested in Portuguese companies, accelerating further growth and competitiveness.

Source: Senior Vice President Business Development, Sales and Marketing, CTS Group

CHAPTER 5

THE DATA CENTRE SECTOR CAN FOSTER A RANGE OF SOCIO-ECONOMIC AND SOCIAL BENEFITS IN PORTUGAL

Key insights

- The data centre sector can foster a range of socio-economic and social benefits in Portugal. We have identified **four key areas in which** these benefits materialise.
- *First*, the sector **supports employment**. We estimate that:
    1. The sector supported a total of **2,151 full-time jobs in Portugal in 2024**. This includes 1,424 employees supported through direct (604) and indirect (820) effects, and 730 full-time jobs supported by induced effects associated with the increased activity throughout the economy, associated with the spending of salaries.
    2. Favourable investment conditions could lead to the sector supporting a total **annual average of up to 48,400 full-time jobs between 2025-2030**. This includes approx. 3,045 jobs supported through direct effects, 24,143 jobs supported through indirect effects, and approx. 21,213 jobs supported by induced effects.
    3. Less favourable investment conditions could lead to the sector supporting a total annual average of 13,487 full-time jobs between 2025-2030.
- *Second*, the sector **contributes to attracting and retaining skilled workers** in different regions and helps reverse "brain drain" by supporting jobs that often require specialised technical skills. Stakeholders have noted that many of these jobs span various sectors and provide attractive compensation.
- *Third*, the sector **fosters new education opportunities** by collaborating with education institutions and businesses to develop new programs and courses tailored to the sector's needs.
- *Fourth*, the sector can contribute to **increasing territorial and social cohesion** by helping to retain and attract population to peripheral regions, supporting local economic activity, fostering the development of civil infrastructures, and supporting local communities through increased social responsibility initiatives, as reported by several stakeholders.

In this chapter, we explore the wider socio-economic benefits of data centre investments in Portugal. First, we quantify the sector's direct, indirect, and induced employment impacts using a similar IO model as employed in the estimates of GDP contributions, extending projections to 2030. We then examine broader contributions, including talent attraction and retention, the emergence of tech clusters, and regional and social development.

The chapter is structured as follows:

- In **section 5.1**, we set out our methodology (section 5.1.1) and estimate the number of jobs supported by the data centre sector in Portugal between 2022-2024 (section 5.1.2) and between 2025-2030, considering three sector growth scenarios (section 5.1.3).
- In **section 5.2**, we examine how the data centre sector contributes to attracting and retaining talent.
- In **section 5.3**, we consider how the data centre sector fosters new educational opportunities.
- In **section 5.4,** we reflect on how the data centre sector can contribute to improving territorial and social cohesion, benefiting from the perspectives of local stakeholders.

5.1 THE SECTOR IS ESTIMATED TO SUPPORT ON AVERAGE UP TO 48 THOUSAND FULL-TIME JOBS PER YEAR BETWEEN 2025-2030

With our input-output model, we are able to estimate the degree to which investments in different economic sectors support full-time (FTE) job creation in the broader economy. Similarly to the economic contribution, our input data comprises of detailed employee-level data by Start Campus in relation to the construction and operation of the six SINES DC facilities.[129] We have used this data as a proxy to estimate the number of FTEs for the total sector based on the potential capacity by 2030, and given the expected capacity and construction timeline of upcoming data centres for different growth trajectories.

5.1.1 Methodology for the supported employment

For the calculation of employment effects, data on employed persons in each sector is required. We have used data from OECD[130] (2019) for employment in each of the relevant sectors. We use data on the change of the Portuguese labour force to extrapolate the number of employees for the years 2022-2030.

Our input employee data in construction comprises mostly of employees that are involved in construction. Similar to the monetary expenditure, we also include employees in relation to fitout work under construction. Our input employee data in operations comprises mostly employees that are required in the maintenance and management of a data centre's IT systems and hardware, as well as other support roles.

The supported direct jobs stems from the employee demand as such, i.e., from Start Campus' estimate of the total amount of employees required for the SINES DC investment annually during 2022-2030 in both construction and operations, and our estimate of the employee demand for the rest of the sector.

[129] For construction, Start Campus provided detailed information on the number of full-time employees directly in construction, which includes information which was sourced directly from the general contractors.
[130] OECD (2025), Employed population by economic activity, Available here.

For the calculation of the indirect (and induced) jobs supported, we use the construction and operations expenditure for the total sector, which we multiply using so-called employment multipliers from the IO model. As such, these jobs supported do not stem from the input data on the number of employees, but still consider the share of fitout costs in the indirect and induced employment effect fitout costs are included in construction expenditure

We report the total supported employment as the sum of direct, indirect and induced effects. As such, the total supported employment considers both the input data on employees as well as expenditure in construction and operations.

Similarly to the supported economic contribution, we use the three scenarios from Chapter 4 to provide a range for the development of the number of jobs supported beyond 2025.

The data centre sector supports job creation in almost all sectors of the economy through direct, indirect and induced effects:

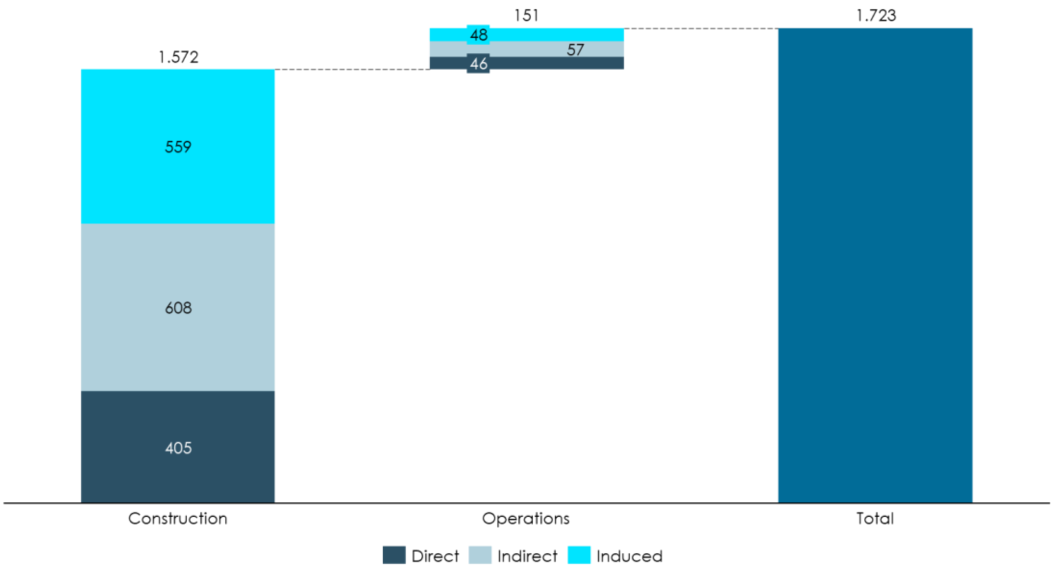
- The **direct employment effects** are directly supported by the data centre operator and its contractors, and as such they are not estimated with a multiplier from the input-output model. The directly supported jobs in construction include a range of general contractors that manage the construction process, including overseeing subcontractors, coordinating schedules, and ensuring that projects meet timelines, budgets and overall quality standards. The directly supported jobs in operations include positions in various support activities, such as in management, maintenance and repair and IT.
- The **indirect effect** stems through the data centre operators' use of various suppliers, and includes jobs in security, catering, cleaning and in various other upstream supply industries. We use so-called employment multipliers from the input-output model to estimate the number jobs supported by indirect and induced effects.
- The **induced effect** refers to the supported employment contribution that occurs when employees at data centres and their supplier industries spend their wages throughout the entire economy. The induced effects support employment mostly in private services.

5.1.2 The sector supported on average 1,723 full-time jobs per year between 2022-2024

Number of jobs supported by the data centre sector remained relatively stable during 2022-2024, reflecting a stable operational capacity of 23 MW and a level of construction activity during this period that was mainly concentrated on Start Campus' SIN01.

On average, the number of jobs supported during 2022-2024 amounted to 1,723 employees, considering direct, indirect and induced effects, see **Figure** 21.[131]

Figure 21
The data centre sector supported on average 1,723 full-time jobs per year between 2022-2024, considering direct, indirect and induced effects
Full-time employees



Note: Total employment supported by the data centre sector, 2024. The total includes supported employment arising from direct, indirect and induced effects.
Source: Copenhagen Economics based on data provided by Start Campus, an estimate of capacity for the rest of the sector and our input-output model.

Of the total employment supported during 2022-2024, the share attributable to direct and indirect effects averaged 1,116 employees. Additionally, 607 full-time jobs were supported on average by induced effects.[132]

5.1.3 Favourable investment conditions could support an annual employment of up to 48 thousand full-time jobs between 2025-2030

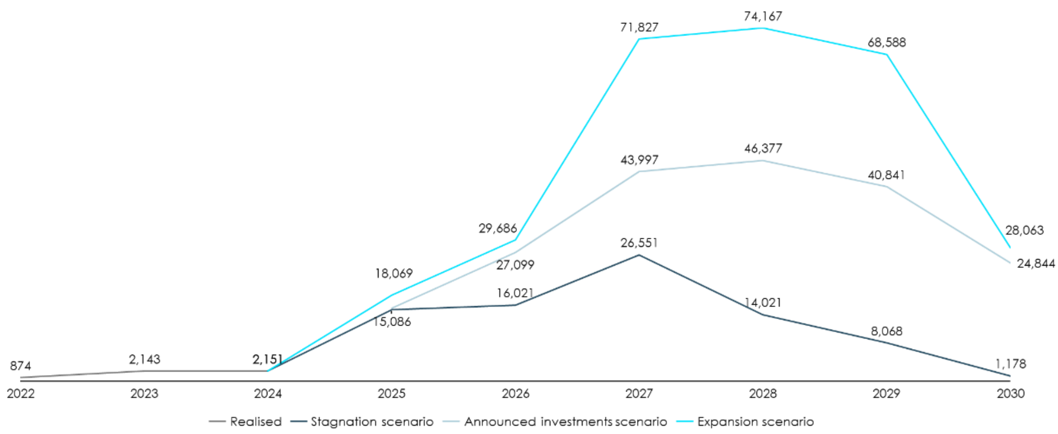
Similar to the economic contribution, we account for the uncertainty that concerns investment levels beyond 2025 by providing a range for the supported employment in each of the three scenarios: i) **the stagnation scenario**, ii) **the announced investments scenario**, and iii) the **expansion scenario**.

In the announced investments and expansion scenarios, the busiest construction years comprise the years 2027-2029. The employee demand for operations peaks in 2030 in all three scenarios.

We show the total employment supported during 2022-2030 below in Figure **22**.

[132] The supported employment from direct, indirect and induced effects during 2022-2024 amounted to 13, 389 and 353 in 2022; 618, 786 and 740 in 2023; and 604, 820 and 727 in 2024, respectively.

Figure 22
Total supported employment impact of the Portuguese data centre sector, 2022-2030
Full-time employees



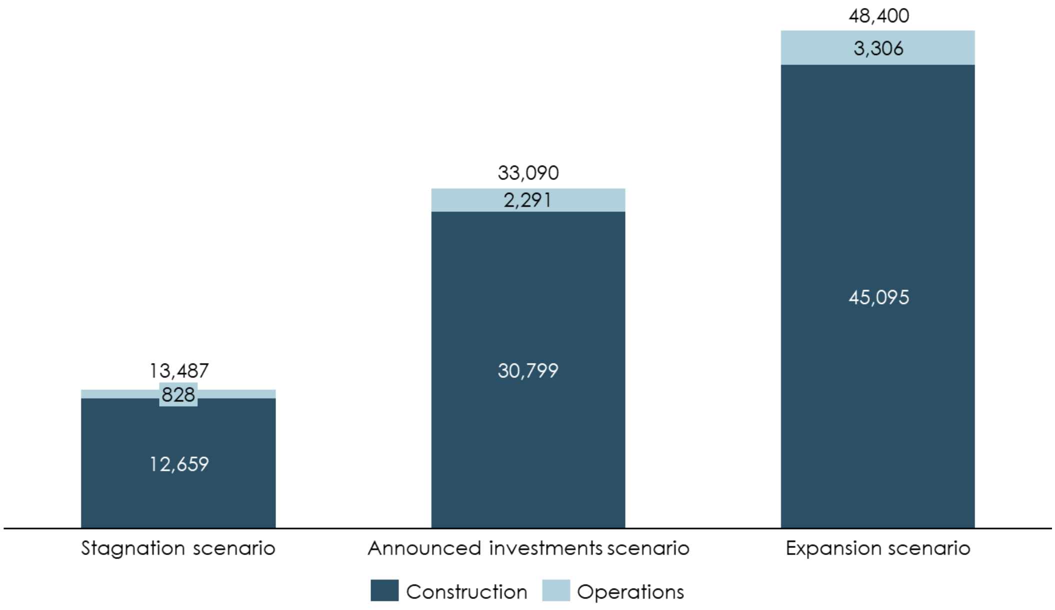
Note: The figure includes the direct, indirect and induced effects for both construction and operations until 2024 and for the three scenarios that depict the different levels of potential capacity in the sector during 2025-2030.

Source: Copenhagen Economics based on data provided by Start Campus, an estimate of capacity for the rest of the sector and our input-output model.

During the busiest construction years 2027-2029, the total employment supported exceeds 40,000 in the announced investments scenario and 68,000 in the expansion scenario.

We estimate the average annual employment supported to range between 13,487 and 48,400 employees in the three scenarios during 2025-2030, see **Figure** 23.

Figure 23
Average employment supported annually during 2025-2030
Full-time employees



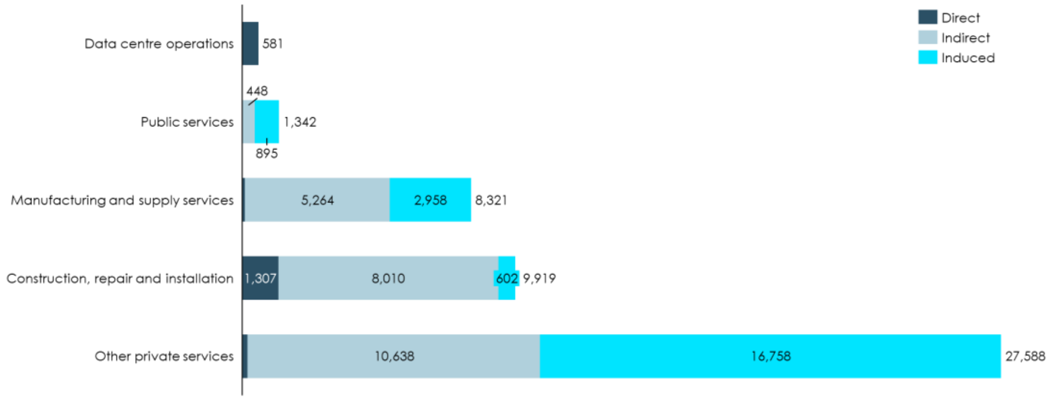
Note: The figure includes the supported contribution from direct, indirect and induced effects.
Source: Copenhagen Economics based on data provided by Start Campus, an estimate of capacity for the rest of the sector and our input-output model.

Of the employment supported, we estimate the share of direct and indirect effects to range from approx. 7,600 to 27,200 employees.[133] In addition, we estimate the average employment supported from induced effects to range from approx. 5,900 employees in the stagnation scenario to approx. 21,200 employees in the expansion scenario.

With our IO model and the input data for the demand for construction and operations employees, we are able to assess how data centre activity flows across the economy. We find that during 2025-2030, the construction and operations activity in the data centre sector will support direct and indirect employment primarily in private services (10,831 FTEs), construction (9,317 FTEs per year) and manufacturing (5,363 FTEs per year), see Figure **24**.

[133] In the expansion scenario, the supported employment contributions from direct and indirect effects amount to 3,045 and 24,143 employees on average, respectively.

Figure 24
Employment supported across the economy between 2025-2030 in the expansion scenario
Full-time employees, yearly average



Note: 'Other private services' includes (but are not limited to) retail trade, transport, hotels and restaurants, real estate, and legal, accounting and employment activities. Contrary to other employment figures and supported contributions in this report, we calculate those for this figure with an alternative IO matrix calculation. Due to the way our input data is structured, this alternative calculation overestimates the total effect by 0.5 per cent.

Source: Copenhagen Economics based on data provided by Start Campus, an estimate of capacity for the rest of the sector and our input-output model.

In addition to the construction and manufacturing sectors, the data centre sector's activities support private consumption as employees spend their wages throughout the economy. These induced effects support employment mostly in private services (16,758 FTEs per year).

5.2 THE SECTOR CONTRIBUTES TO ATTRACTING AND RETAINING TALENT

The construction and operation of a data centre supports employment in numerous sectors and occupations, many of which require advanced/specialised technical knowledge. With this contribution, particularly in operations, data centres can help to retain skilled workers not only in different regions within Portugal, but also in the country in general, as opposed to the counterfactual that they would move to other countries for these jobs ("brain drain").

> Investments like Start Campus contribute significantly to regional development and help retain local youth by providing job opportunities and attracting new, highly qualified talent to the region, which helps combat population decline and further supports local economic growth

Source: Director, Escola Tecnológica do Litoral Alentejano (ETLA)

According to the mayor of Sines, Nuno Mascarenhas, data centre investment in the region contributes to the retention of younger people in the region through various channels. These channels include not only the construction and operation of the facilities, but also training programs that seek to prepare e.g., graduates for employment in these facilities. Together, such factors help retain a workforce with a diverse skill set in Portugal, including various construction and installation workers, technicians, as well as highly skilled graduates and students.

> The municipality of Sines has together with local businesses created conditions for higher education and technical training programs in areas related to data centres. These help retain young people in the region and develop a skilled workforce.

Source: Mayor of Sines

Accordingly, there is the potential for the data centre sector to help "reverse" the "brain drain" of a highly skilled workforce, i.e., to not only retain talent but also attract it back to Portugal.[134] This is relevant because Portugal competes with other European data centre markets for talent. In addition to the demand for skilled workers in the operation of data centres, other businesses that relocate or set up an office in Portugal for a close proximity to a data centre can accelerate this demand.

5.3 THE SECTOR FOSTERS NEW EDUCATION OPPORTUNITIES

Data centres' demand for high-skilled workers in various fields can support new education opportunities. Data centres, and other stakeholders in the broader digital ecosystem, provide examples of partnerships and collaboration programs with local educational institutions, other private businesses or public institutions that foster new education opportunities.

134 Our interview with Equinix's Managing Director for Portugal, Carlos Paulino & CTS Group's Senior VP for Business Development (EMEA), Eduard Pacuku.

Recently, a general shortage of data centre workers in Europe has emphasized the need for this collaboration.[135] Leading global data centre operators have partnered with universities to create educational programs and curricula that specifically prepare students to work with either data centres or with digital infrastructure more generally.[136]

There are several examples of collaboration between stakeholders in the digital ecosystem in Portugal, including data centres and education institutions. These programs aim at fostering skills and specialised competences considered particularly relevant in fields related to digital services and infrastructure. For example:

- Telecommunications and data centre operator NOS recently initiated collaborations with both the NOVA School of Science & Technology and the engineering and science facility of the University of Lisbon (Técnico).[137]
- Altice, who operates the Covilhã data centre, has previously partnered with several academic institutions in Portugal to support training in the fields of big data, AI and digital infrastructure. These include the NOVA University of Lisbon, the European University of Lisbon and the University of Algarve.[138]

> Data centres can lead to the creation of specialised courses and certifications, which prepare students for careers in data centre operations and related fields. In our school we have partnerships with data centre operators that help us adapt existing curricula and develop new programs tailored to the sector's needs.

Source: Director, Escola Tecnológica do Litoral Alentejano (ETLA)

The extent of collaboration between data centre operators and universities is likely to increase in Portugal in the coming years as new facilities become operational and further ones start being constructed, especially if there are policy measures to support the sector's development. The capacity of the total sector is expected to increase from 37 MW at the end of 2024 to well over 100 MW by 2027 with the potential for much more depending on the growth trajectory. To be able to operate this capacity, data centre operators will have to employ a rapidly increasing number of particularly STEM students.

135 See e.g., JLL (2023), Available here; and Savills Research (2023), Available here.
136 Ibid.
137 NOVA FCT (2024), Available here; Técnico Lisboa (2022), Available here.
138 NOVA (2021), Available here; MEO/Altice (2022), Available here; Altice Labs (2020), Available here.

> NOS is involved in programs to accelerate digital transformation for small and medium-sized enterprises (SMEs) and startups. These initiatives provide access to infrastructure and technologies that might otherwise be out of reach for smaller businesses.

Source: B2B Cloud and Data centre Manager, NOS

The Portuguese data centre association has already initiated two scholarship programs to which students in the final years of their studies may apply to learn different skills that are relevant in a data centre.[139] In the Sines region, the municipality also participates in the facilitation of higher education training courses and programs to support employment in local data centres.[140] Initiatives that are targeted towards students and recent graduates are particularly important in retaining skilled talent in Portugal.

5.4 THE SECTOR CAN CONTRIBUTE TO INCREASED TERRITORIAL AND SOCIAL COHESION

Data centres can support the public administration in the development of different regions by bringing about extensive human and physical capital externalities as an infrastructure investment – that is, other, less directly attributable, impacts which go beyond the IO model. This is particularly relevant for more peripheral areas.

Data centres can help not only to retain the population but also to attract it to different regions. Though the Portuguese data centre market is concentrated (in number of data centres) in proximity to large urban areas, facilities exist and are further developed also in other parts, namely in Porto, Sines and Covilhã. This development can support territorial distribution by ensuring that economic opportunities are available in various parts of the country.

> Our experience is that, in complement to the significant economic impact on local businesses and jobs, data centre operators like Start Campus can have a highly positive social impact on the community.

Source: Mayor of Sines

[139] Portugal DC (2025), Available here.
[140] Our interview with the mayor of Sines, Nuno Mascarenhas in February 2025.

Besides the direct contribution from the data centres, various supply sectors and infrastructure investments that are relevant to their operation add to the potential support for local economic growth and the creation of job opportunities. These stem, for example, from energy infrastructure, such as updates to the electricity grid and/or nearby power generation facilities.[141] Besides energy infrastructure, data centres in more peripheral regions often also require improvements to road transport as well as internet connectivity infrastructure.

> Data centres help improve social and territorial cohesion by expanding broadband coverage, reducing digital inequalities, and contributing to providing access to healthcare, education, and public services in all regions, including rural areas. This supports digital inclusion and economic development throughout the country

Source: President of the Board, ANACOM

In addition to contributing to infrastructure investments, data centres lay the ground for longer-term territorial development by attracting other businesses to locate nearby. This concerns both domestic and foreign businesses (i.e., foreign direct investment as discussed in Chapter 4), and by another division, suppliers to the data centre and (technology) businesses that benefit from a close proximity to a data centre.

Data centres contribute to social cohesion by closely coordinating with other stakeholders in the area on collective efforts to promote the area's suitability for investment and growth, as well as advancing its reputation. Additionally, data centre operators may foster social cohesion in the regions by direct support for smaller-scale initiatives, see Box 5.

[141] Data centres can trigger significant infrastructure investments (and growth) across related sectors. For example, investments in electricity production, transmission and distribution, thus potentially further contributing to the economic development and the implementation of new infrastructures at the regional level – i.e., in less densely populated areas compared to the capital region. See e.g., McKinsey (2024), How data centers and the energy sector can sate AI's hunger for power, Available here.

Box 5 Data centre operators support territorial development and cohesion with social initiatives within local communities

Start Campus supports additional investment in the Sines region with its Gamma Community Platform. The platform operates as a funding programme for eligible initiatives in the region that support one of the following pillars: educational development, environmental conservation, initiatives that bring community members together and entrepreneurship.

In 2023, the platform granted EUR 100k for the following three projects:

- +Saude: at-home physiotherapy for the elderly.
- Maré de Ciencia: promoting the scientific literacy of children from low-income communities through letter exchange with selected scientists in Sines.
- Espiga: promoting mental health (self-esteem skills and emotional identification) as well as environmental awareness among children in schools in the Sines region

Source: Start Campus (2025), available at [Link].

CHAPTER 6

POLICY CONDITIONS WILL SHAPE FUTURE INVESTMENTS AND BENEFITS

Key insights

- **Policy conditions will shape the level of future investments** in the data centre sector in Portugal and the corresponding economic benefits to GDP and employment.
- **Five areas** that policymakers may consider **to (i) address challenges that could block or delay investment and (ii) support the data centre sector** in realising its full potential:
  1. First, **protect against restrictions on the trade of advanced technologies, in particular semiconductor chips.** Policymakers should strive to ensure that the evolving geopolitical landscape does not result in restrictions that affect Portugal, e.g. restricting the import of semiconductor chips or other components that are essential for the development of the sector.
  2. Second, **streamline permitting and other regulatory processes.** Stakeholders describe the process of getting permits and licenses related to (i) data centres, (ii) subsea cables and (iii) ducts to house fibre networks, as complex, burdensome, and lengthy. Streamlining and improving processes could reduce the risk of blocked or delayed investments.
  3. Third, **ensure continued access to the electricity grid.** Access to the electricity grid is essential for data centres. Addressing challenges to access, by providing more clear information on constraints, and by fostering predictability regarding the expansion of energy supply, can foster the growth of the data centre sector.
  4. Fourth, **develop measures targeted to data centres that incentivise investments in the sector**. While Portugal has an AI strategy, it lacks concrete measures that focus on data centres. Portugal may draw inspiration from other countries with clearer policies to support data centres, e.g. designating areas for data centre investments, or providing financial incentives.
  5. Fifth, **stimulate the adoption of digital tools**. Portuguese businesses use third-party cloud services to a lesser extent than their EU counterparts. Furthering the adoption of cloud services and other digital solutions such as AI can contribute to enhancing Portugal's attractiveness as a destination for data centre investments.

In this chapter, we reflect on how the policy landscape may affect future investments and the expansion of the sector in Portugal and how policymakers can seek to support continued investment.

As shown in the previous chapters, the data centre sector in Portugal can support significant economic benefits. Data centres can support an accumulated contribution to Portugal's GDP of up to EUR 26.2 billion in total over the 2025-2030 period and support up to 48,400 jobs annually, considering direct, indirect and induced effects. Moreover, data centres spur further growth by enabling the digital transition, fostering the adoption of digital tools that increase productivity and innovation, and driving significant FDI into Portugal.

However, the full extent of these benefits is not guaranteed and will depend on incentives and ability to invest. As explained in chapter 4, the sector can take different growth trajectories depending on investment conditions. We estimate that less favourable investment conditions could reduce the potential benefits by a total of EUR 20.1 billion and by up to 34,900 jobs by 2030, compared to a more favourable scenario.

Policy choices will shape future investments in the data centre sector in Portugal and its benefits. Drawing on research and stakeholder insights, we identify the main barriers to the sector's development. In the following sections, we explore these challenges, reflecting on the importance of a supportive policy framework and referencing international policy initiatives aimed at fostering digital infrastructure ecosystems.

The chapter is structured as follows:

- In **section 6.1**, we describe the importance of ensuring that Portugal is not constrained by restrictions on the trade of advanced technologies critical for data centres such as semi-conductor chips.
- In **section 6.2**, we discuss how streamlining permitting and regulatory processes related to data centres, subsea cables and fibre networks can foster data centre investments.
- In **section 6.3**, we explain how reliable electricity grid access and information on future capacity is vital for data centres.
- In **section 6.4**, we describe concrete measures to foster data centre investments that may be considered, alongside existing AI and digital strategies, inspired by policies from other countries.
- In **section 6.5**, we reflect on the adoption of digital tools and explain how alongside other factors it can contribute to making Portugal a more attractive data centre investment location.

6.1 PROTECT AGAINST RESTRICTIONS ON THE TRADE OF ADVANCED TECHNOLOGIES

The evolving international policy landscape in the semiconductor sector could impact Portugal's data centre investments. The intricate interplay of these policies has created a complex environment, with recent changes in export controls, national strategies, and global cooperation mechanisms reshaping access to critical technologies.

If these frameworks shift unfavourably, Portugal might face difficulties in obtaining advanced semiconductor chips, which are the backbone of processing and absolutely essential for AI workloads. Consequently, this could hinder the country's ability to attract and sustain data centre demand and investments, although such restrictions are not guaranteed.

Any significant restriction to the ability of operators in Portugal to access advanced semiconductor technologies, especially AI-grade semiconductor chips, may trigger three key consequences for the data centre in Portugal.

First, Portugal's ability to develop large-scale AI infrastructure may be significantly limited. Modern data centres designed to support AI workloads require a substantial number of advanced semiconductor chips to operate effectively.[142] Beyond constraining the growth of the sector, restrictions on the number of advanced semiconductor chips that can be imported could narrow Portugal's role in AI computing and reduce the potential benefits associated with the development and adoption of AI in the country.

Second, Portugal could be at a relative disadvantage compared with countries that may not face the same restrictions, potentially leading to a diversion of investments. A disparity in restrictions between different countries creates an incentive for data centre operators requiring advanced AI capabilities, such as high-performance semiconductor chips, to locate their data centres in countries where their clients have unrestricted or less restricted access to critical components. In our interview, one established international data centre operator has outlined this risk for the sector in Portugal, see below.[143]

> It is very important that Portugal avoids (…) [restrictions on access to advanced chips, which] may be contributing to some investments being diverted to other countries, and (…) [which] will ultimately put a ceiling on the growth potential of the sector.

Source: Managing Director for Portugal, Equinix

Third, restrictions on trade and access to semiconductor chips or other key inputs for data centres and AI development can harm Portugal's reputation as a developing technological hub, possibly weakening investors' trust in the future development of the data ecosystem in the country. Insofar as data centre investments could foster other investments in the wider digital ecosystem, as reported by several interviewees, a less positive outlook for the data centre sector can negatively impact other related investments.[144]

6.2 STREAMLINE PERMITTING AND OTHER REGULATORY PROCESSES

Interviews with stakeholders in the data centre sector reveal that the framework for permits and licenses related to data centres and their critical inputs is perceived as complex, burdensome, and lengthy. Moreover, this process reportedly often involves multiple entities that do not coordinate with each other. This challenge was perhaps the one mentioned by most stakeholders in our interviews.

142 For example, a 1 GW data centre at full utilisation, and a Power Usage Effectiveness (PUE), would host more than 1 million Nvidia H100 chips.
143 Equinix.
144 Several interviewees noted that Portugal's ability to attract investments in data centres contributes to strengthening Portugal's reputation as an emerging hub for the development of technological and digital industries and to enhancing its attractiveness as an investment destination.

According to stakeholders, the current permitting framework creates obstacles in three main dimensions: (i) construction of data centres, (ii) planning and deployment of subsea cables, and (iii) construction of ducts to house fibre networks.

First, the approval processes involved in the construction of data centres can be complex, cumbersome, and lengthy. One interviewee indicated that the process of planning and getting regulatory approval can be complex, involving multiple entities that often lack visibility of the interdependencies in their responsibilities.[145] Another interviewee noted more generally the importance of ensuring that permitting is efficient, acknowledging that while the special regime to support projects considered of national interest (PIN) helps streamline processes, similar streamlining mechanisms should be deepened.[146]

> Currently, navigating the multiple regulations can be a challenge for investors. These need to be more efficient to prevent dissuading investments.

Source: Mayor of Sines

Second, the regulatory and permitting framework applicable to the planning and deployment of subsea cables is perceived to be lacking. Both ANACOM and a relevant international tech company noted that the current framework lacks detailed information on crucial aspects like pricing and is not sufficiently streamlined, given the multiple licenses required.

> There are some barriers related to licensing, for example to set up submarine cables, that deserve attention and should be addressed with more agile regulation. This includes access to information and pricing, which are critical aspects that need to be decided and improved.

Source: President of the Board, ANACOM

Third, the current regulatory framework can create barriers to constructing new duct infrastructure to house high-speed networks, hindering network development and affecting the data centre sector, which relies on underground fibre networks for connectivity. Data centres primarily rely on fibre networks installed underground (in ducts) for connectivity.[147] For security reasons, fibre networks installed in poles or other above-ground civil infrastructures are not a suitable alternative, as they are exposed to more risks (e.g., wildfires, sabotage, fibre tapping) and thus less secure and reliable.

145 Mayor of Sines.
146 AICEP.
147 Data centres rely on robust fibre-optic networks to ensure low-latency, high-bandwidth communication, which is critical for cloud services, AI processing, and global data exchange.

However, according to one interviewee, bureaucratic processes and complex regulatory and licensing processes can delay these investments.[148] Obtaining authorisation to construct ducts often involves multiple entities, including local municipalities and Infraestruturas de Portugal, with limited coordination, making the process burdensome and lengthy.

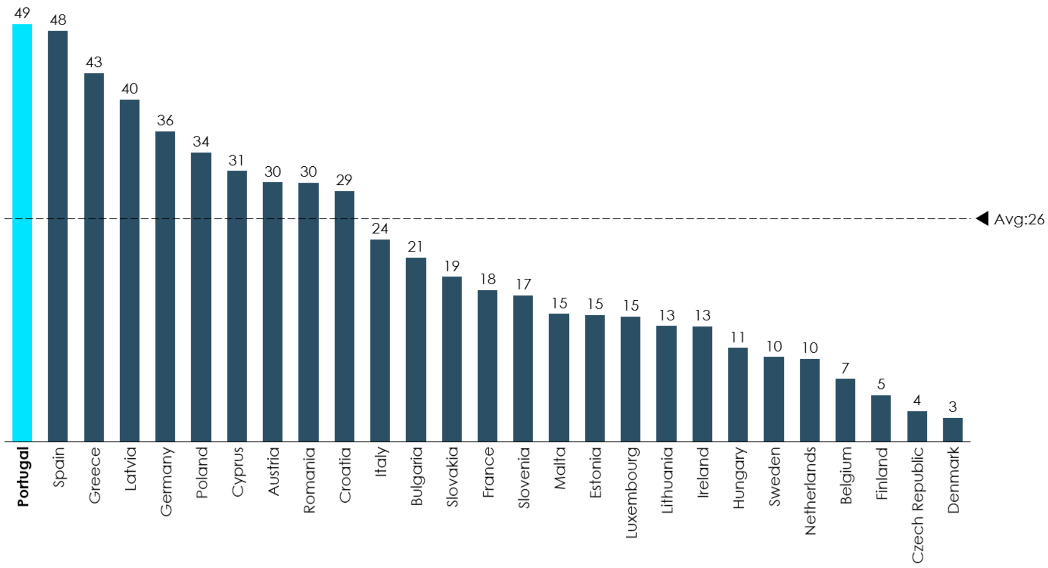
> One of the main challenges to the development of the data centre sector is the regulatory regime, which makes it difficult to construct the ducts for high-speed networks. For safety reasons, networks serving critical infrastructures like data centres need to be installed in ducts. Often, constructing new ducts is a lengthy and cumbersome process given the complex regulations.

Source: Wholesale Director, Altice

In addition to the challenges highlighted by stakeholders, broader regulatory issues in Portugal may further exacerbate risks to future investments. The findings of the European Union's report on obstacles to economic activity align with feedback from the data centre sector, where complex and burdensome regulatory frameworks hinder timely investments and development.[149] According to the report, Portugal is the country in the EU with the highest share of firms reporting business regulations as a major impediment to investment, see Figure **25**.

148 Altice Portugal.
149 European Commission (2025), Obstacles to Economic Activity in the EU - a survey-based analysis, Available here.

Figure 25
Portugal is the country in the EU with the highest share of firms reporting business regulations as a major impediment to investment
Per cent



Note: Survey Question: Thinking about your investment activities, to what extent is each of the following an obstacle? Is it a major obstacle, a minor obstacle or not an obstacle at all? – Business Regulations
Source: European Investment Bank Investment Survey (EIBIS) (2023).

6.3 ENSURE CONTINUED ACCESS TO THE ELECTRICITY GRID

Ensuring continued access to the electricity grid is critical for data centre operators and investors when deciding where and whether to invest. Data centres require large amounts of uninterrupted power, which usually requires a stable connection to the public service electricity grid (grid) with high capacity.

Grid limitations can also hinder longer-term sector growth and competitiveness. Investors generally prioritise regions with robust and future-proof energy infrastructure. If a country or region struggles to upgrade its grid in line with increasing demand, it risks losing out to markets with more proactive energy policies and better-integrated renewable energy strategies.

Information on existing constraints and capacity availability is also a key aspect of grid connectivity for data centre operators. Grid investments can take longer than development cycles for data centres, meaning that grid constraints may not be easily resolved.[150] This supports that up-to-date and

[150] See, e.g., Energy Exemplar (2025), The Data Cent Surge: The Latest Energy Dilemma and the Path Forward, Available here.

transparent information on grid availability/restrictions may reduce the risk for investors and therefore contribute to support the growth of the data centre sector.

According to the evidence gathered in our interviews, constraints and uncertainty regarding access to the electricity grid can hamper data centre investments. Additionally, the unpredictable supply of renewable energy, compounded by limited information on government auctions for new sites, further complicates planning and sustainability efforts. Furthermore, insufficient data on potential restrictions, such as access to water for cooling systems, adds another layer of complexity, making it difficult for operators to ensure reliable and efficient operations.

Current capacity constraints in the Portuguese grid may limit new investments. According to three interviewees, there are currently capacity constraints that may render some areas unsuitable for large data centre projects.[151] One of the interviewees further indicated that existing constraints are mainly a result of (i) the growing demand for capacity suitable to support large loads, and (ii) the lack of mechanisms to manage the increasing complexity of the grid.

> We do have, as many other countries have, constraints in terms of access to the grid. [This is an] issue that we have to deal with to be able to host more data centre projects on a large scale. If we do that, we would be in a position to be at the forefront, at least in Western Europe, of receiving and hosting AI data centres.

Source: Senior Inward Investment Manager, AICEP

Reliable connectivity is also relevant for projects relying on *onsite* energy production to reduce investment risks. Projects can rely on onsite electricity production and therefore operate without connection to the grid. However, this can entail additional risks for the energy producer, which will be reflected in the cost of capital and the overall efficiency of the project.[152]

In addition to existing capacity constraints, two interviewees pointed to a lack of information on (i) planned procedures (e.g., auctions) for the production of renewables and (ii) on future capacity/constraints of the grid. *First*, a senior expert of an energy company indicated that the lack of visibility about future procedures for the development of energy production sites creates uncertainty for prospective data centre investments. *Second*, interviewees pointed out that there is no visibility on whether currently available capacity will be exhausted by already planned investments, adding further uncertainty.[153,154]

151 Energy provider, AICEP, Equinix.
152 For example, if there is a risk that the data centre might shut down, a connection to the grid allows the electricity producer to continue its operations by supplying the generated electricity to the grid.
153 Cf. interview conducted by Copenhagen Economics on 07.03.2025 with an energy company active in Portugal.
154 Equinix (cf. interview conducted by Copenhagen Economics on 27.02.2027). "*it difficult to access information on the actual capacity of the national greed to plan for data centre investments*".

> Beyond the challenges of accessing the grid, there is also a lack of clear information and predictability regarding the growth of renewable energy supply. This is largely because it remains unclear when the government will open new allocation procedures for additional production capacity.

Source: Senior expert, relevant energy company

6.4 DEVELOP MEASURES AIMED AT SUPPORTING INVESTMENTS IN THE DATA CENTRE SECTOR

Developing concrete policies to foster investments in data centres can support the growth of the sector while simultaneously contributing to the broader digital ecosystem. Incorporating data centres into national AI or digital strategies, with concrete measures to support favourable investment conditions, can help the sector realise its full potential and maximise the broader benefits for society.

Portugal currently has two main policy frameworks guiding Portugal's digital transformation and AI development:

1. AI Portugal 2030[155] (AI Strategy), published in 2019; and
2. Portugal Digital Strategy[156] (Digital Strategy), published in 2024.

These policy frameworks aim to enhance AI adoption, support innovation, and develop the necessary infrastructure and skills. However, these initiatives lack concrete measures to facilitate and promote investments in the expansion of the data centre sector, see Box 6.

155 AI National Strategy (AI Portugal 2030), Available here.
156 Portugal Digital Strategy, including its 2025-2026 action plan, Available here. The document includes a set of sixteen initiatives to be carried out between 2025-2026.

Box 6 The main AI policy initiatives lack concrete measures to foster data centres

The AI Strategy

- The AI Strategy seeks to increase the use of AI solutions in both the public and private sectors, its scientific research and the required skills of the Portuguese workforce to operate AI solutions. The AI Strategy acknowledges the need for additional computing power and data storage that is required for the increased use of AI solutions.
- However, it does not make any direct reference to data centres nor provide more detailed measures to foster investments in Portugal by private operators. The AI strategy only broadly refers to the importance of promoting "*the availability of an adequate computing infrastructure*", without providing more concrete actions.[157]
- Conversely, while it acknowledges the importance of advanced computing, such a reference is framed in the context of the European High Performance Computing (EuroHPC) ecosystem and focused on the development of publicly run supercomputers like Deucalion.[158,159]

The Digital Strategy

- The Digital Strategy outlines several measures and actions that relate to data centres, computing power, storage infrastructure, and overall digital infrastructure. On the digital infrastructure dimension, it focuses on creating a modern, secure, and resilient digital infrastructure, recognising that it is fundamental for digital transformation in Portugal.
- However, among the concrete actions planned for 2025-2026, only one action relates to computing capacity (Action 10.3., "Acquisition of dedicated computing capacity for Artificial Intelligence"). Like in the AI Strategy, this allusion to computing capacity seems to be referring specifically to the narrow context of the EuroHPC, considering the refence to the supercomputer Mare Nostrum 5.

Source: Copenhagen Economics

In contrast with Portugal, the national AI strategies of the UK, Spain and France include distinct measures and incentives to attract data centre investment, including measures beyond the digital ecosystem that are critical for data centres, e.g., aiming to increase the production of renewable energy. In Germany, Belgium and Finland, similar to Portugal, the corresponding AI strategies do not refer data centres directly, see Figure **26**.

157 See specific actions in p.27 of the AI Strategy, Available here.
158 See p.25 of the AI Strategy, Available here.
159 Deucalion is a supercomputer, inaugurated in September 2023, funded by the Recovery and Resilience Plan and managed by the Foundation for Science and Technology (FCT). Deucalion is also currently accessible to researchers who want to boost their projects by exploiting this innovative computational resource. See additional details here.

Figure 26
Some countries explicitly cover data centres in their national AI strategies

Country	Explicitly calls for more data centre investment	Concrete measures for data centre investment
United Kingdom	✓	✓
Spain	✓	✓
France	✓	✓
Germany	✗	✗
Belgium	✗	✗
Finland	✗	✗
Portugal	✗	✗

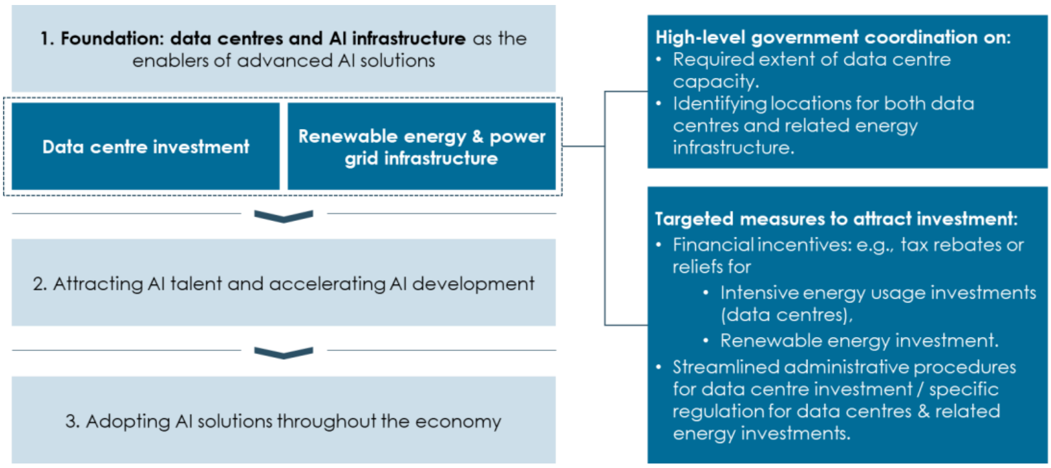
Note: Information in the table only refers to the extent of measures to attract data centre investment as outlined in the national AI strategies. It excludes possible measures that have been announced as separate of the national AI strategy. The table reflects our own assessment of the national AI strategies analysed. Our assessment included a combination of targeted searches for references to data centres and an assessment of the measures identified. In the middle column, the red symbol indicates the cases where we did not find direct references to data centres. However, this does not reflect an assessment of references to other elements of the digital ecosystem, such as references to the importance of computing infrastructure.

Source: Copenhagen Economics, based on official national AI strategies: UK(2025): [Link] / Spain(2024): [Link] / France(2025): [Link] / Germany(2023): [Link] / Belgium(2024): [Link] / Finland(2022): [Link] / Portugal(2019): [Link].

Policymakers in Portugal could potentially draw inspiration from the measures in other countries, specifically aimed at fostering investments in data centres. Similar to the AI Portugal 2030 strategy, the AI strategies of UK, Spain and France acknowledge the role of data centres in supporting the adoption of AI solutions. The key difference lies in the specific measures that UK, Spain and France describe to attract data centre investment.

We illustrate below how targeted measures adopted in the UK, Spain and France seek to ensure favourable conditions for data centre investments across dimensions such as permitting, access to electricity, and the provision of guidance and information on suitable areas for data centre investment, ultimately intended to support the objectives of AI development and adoption, see Figure **27**.

Figure 27
Data centre investments often play a key role in the AI strategy of EU countries



Note: The role of data centres in the national AI strategies of the UK, Spain and France.
Source: Copenhagen Economics based on UK (2025): [Link] / Spain (2024): [Link] / France (2025): [Link].

In conclusion, the strategies in the UK, Spain and France exemplify the role of government coordination and incentives in facilitating the development and investment in data centres, which serve as the foundation for broader AI and digital transformation. Each of the AI strategies in these countries simultaneously:

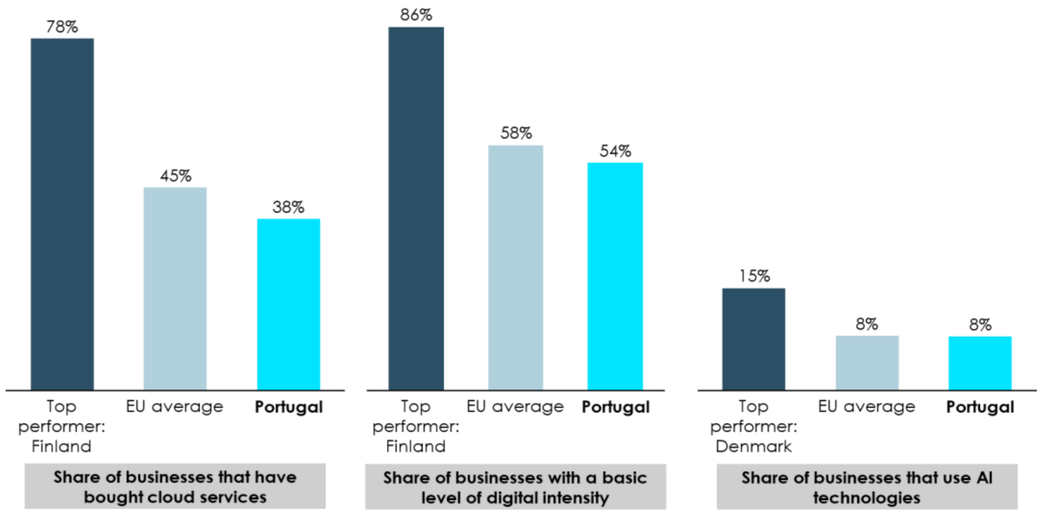
- **Highlights the role of data centres and related energy infrastructure as core components of increased AI adoption**. As we illustrate in Figure **27**, these investments precede the wider development of AI solutions. Besides seeking to increase data centre investment, the three strategies suggest increasing the provision of renewable energy in locations adjacent to upcoming data centres.
- Acknowledges the role of the government in coordinating efforts of several entities to **identify suitable locations for future data centre investments**. The strategies refer to regions that would be most beneficial for upcoming data centres, such as coastal Scotland in the UK. The French strategy has identified 35 different regions in mainland France for different types of upcoming data centres. The government can further support data centre developers by identifying the need for additional energy infrastructure and locations for it so that they would be close to both envisioned data centres and the grid.
- **Outline streamlined administrative procedures** and regulation for data centres as a measure to accelerate investment by reducing procedural barriers.
- In addition, the strategies of UK and France outline **monetary incentives** with which the government may seek to attract investments in data centres, as well as the related renewable energy infrastructure. As suggested in the two strategies, these could include tax rebates or other financial reliefs for e.g., the intensive energy usage of a data centre or for investment in related renewable energy infrastructure.[160]

6.5 STIMULATE THE ADOPTION OF DIGITAL TOOLS

Evidence on the adoption of digital technologies suggests that Portugal is in an early stage of digitisation compared with other EU countries, which may delay investments prioritising more mature markets. In the private sector, the use of digital technologies in Portuguese businesses is generally below the EU average, and significantly below the most technologically advanced EU countries, see Figure **28**.

[160] Regarding financial incentives, the French strategy includes a tax rebate of EUR 10.5 per megawatt hour (MWh) for data centres that meet specific conditions and a discount of EUR 5.7 per MWh off the network fee for high-voltage projects, see (here).

Figure 28
Portugal lags behind the EU average and well behind top performers in the adoption of digital technology
Per cent



Note: Adoption levels of digital technologies in the private sector, Portugal compared to EU countries in 2023. The figure depicts the total for SMEs and large businesses.
Source: Eurostat (2024): Digitalisation in Europe, Available here.

First, Portuguese businesses use third-party cloud services to a lesser extent compared to their EU counterparts. In 2023, 38 per cent of Portuguese businesses bought cloud computing services, compared to an average of 45 per cent across the EU. The use of third-party cloud services is more prevalent among large businesses compared to SMEs.

Second, Portuguese businesses trail their EU counterparts in the level of digital intensity.[161] 58 per cent of businesses in EU countries possessed a basic level of digital intensity, compared to 54 per cent of Portuguese businesses.

Third, Portuguese businesses are on par with their EU counterparts in the adoption of AI technologies, but significantly behind the best-performing country. In Portugal, 8 per cent of businesses are reported to have used AI technologies in 2023, similar to the EU average, but well below the adoption in Denmark, reported at 15 per cent.

By all three metrics, Portugal is far from the top European performers. Generally, these include the Nordic and Benelux countries. A low adoption of digital technologies, particularly the use of cloud

[161] Defined as the level of digitalization in businesses based on their adoption and usage of various digital technologies, measured through a composite indicator (digital intensity index), derived from a survey on ICT usage and e-commerce in enterprises. The indicator is calculated based on 12 variables covering several key aspects, including uptake and usage of information and communication technologies (ICT), the level of digital skills among employees within the company and the integration of digital technologies into business operations and processes. For additional detail on digital intensity, see Eurostat, DESI, information on data, Available here.

services, can slow down the growth of the data centre sector.[162] With limited growth in the demand for cloud computing – a vital element that drives data centre investment – Portugal may appear less attractive for data centre operators.[163]

> (…) the optimal conditions for the investment to move forward are not yet in place. (…) The decision to use data centres in different countries also depends heavily on the local ecosystem. (…) To do so [i.e., have a data centre] in Portugal, we need to look at the market conditions, at the issue of adoption. (…) There is undoubtedly a path to be made in the public sector regarding cloud adoption.

Source: Manuel Dias, National Technology Officer at Microsoft Portugal, Interview to ECO, published on 3 March 2025. Available here. (our translation)

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162 See e.g., the CTO of Microsoft Portugal's interview with ECO, Available here; and Alvarez & Marsal (2024): Global Data Centre Insights 2024, Available here.

163 See e.g., JLL (2023): 1H 2023 North American Data Centre Report, Available here.

GLOSSARY

TERM	DESCRIPTION
Cloud services	Resources provided over the internet by third-party providers, allowing users to access computing power, storage, and applications without needing to manage physical hardware.
Internet of Things (IoT)	The term Internet of Things refers to the collective network of connected devices as well as the technology that facilitates the communication between said devices and the cloud as well as among themselves.
IoT Devices	IoT devices are nonstandard computing hardware that connect wirelessly to a network and can transmit data, e.g. Smart-TVs, Smart-Speakers, and wireless manufacturing sensors.
AI services	Programmes and web-based services which provide AI-powered capabilities such as machine learning, natural language processing, and predictive analytics.
Data centre capacity	The ability of a data centre to meet a certain workload demand, usually measured in available energy supply (W).
Computing power	The capability of a data centre to perform calculations and process information. Is measured with so-called floating-point operations per second or FLOPS.
Data centre operator	A company or other institution responsible for managing and maintaining a data centre's operations as well as offering its services.
Redundancy	The practice of duplicating critical components or systems in a data centre (e.g., power, cooling or network infrastructure) to ensure resilient/uninterrupted operations during disruptions.
Digital services	Any and all services and resources that are accessed through the internet.
Connectivity	The ability of devices, systems, and networks to connect and communicate with each other.
Latency	The times it takes for a request to go from the client to the server and back to the client again.
Fibre-to-the-premises	Telecommunications infrastructure used to deliver high-speed internet connectivity directly to end-users.

Digital infrastructure	The underlying infrastructure which supports the use of all digital services, such as network systems, data centres, and cloud computing resources.
Big data (analytics)	The systematic processing and analysis of large amounts of data and complex data sets
Hyperscalers	Refers to large scale cloud service providers who also own and operate data centres, e.g. Amazon Web Services, Microsoft and Google.