SPAINDC
ASOCIACIÓN ESPAÑOLA DE DATA CENTERS

Q4 2023

THE DATA CENTRE SECTOR IN MADRID

29.05.2024

This report has been drawn up by Spain DC, using various databases that examine the Spanish and European markets, under the technical supervision of Dr María Eugenia Fabra Florit, a lecturer in the Department of Quantitative Methods at Comillas Pontifical University in Madrid, with the assistance of Manuel Giménez Rasero, Adjunct Professor of the Departments of Economics and Public Law of the same university. It seeks to analyse the situation and prospects of Madrid, which has become a connectivity hub for southern Europe, by monitoring trends and the extent to which they are subsequently confirmed on an annual basis.

Spain DC strongly believes that data centres are the core infrastructure of the digital revolution, the green transition and the data society. There is no doubt that Spain has much less digital infrastructure *per capita* than its nearby countries, particularly Europe's most developed economies. It is not Spain DC's place to judge whether this is a desirable situation or whether it could have negative effects on the country's growth, employment or education, among other possible impacts (although this possibility seems fairly obvious).

In the first part of the report, we have set out growth estimates for the sector in Madrid based on the information furnished or published by market players and in the form of projections based on a variety of scenarios.

These scenarios are essentially shaped by regulatory aspects (both in Spain's regional governments and in its central and municipal governments) and are the result of the difficulties and opacity of the regulatory process and of accessing electric power in the electricity distribution and transmission grids.

It is our understanding that the Specific Amendments to the Electricity Transmission Plan have significantly impaired this sector’s development capacity in Spain. Although the Madrid region has been the most detrimentally affected in terms of quantity due to the very nature of the digital infrastructure sector, the Specific Amendments will affect every region in Spain and the country as a whole unless the damage is remedied. Every country in our vicinity has a central hub (Paris, Frankfurt, Amsterdam) that boosts and promotes the development of the country as a whole. Attempting to curb Madrid's growth will only exclude part of the demand (which will simply move to the other major centres) and will hinder the competitiveness of Spain's other regions and of the country as a whole.

It is not for Spain DC to consider whether every project could be successfully completed if the necessary power was available, but what we can categorically assert is that many of those projects do have the necessary resources to do so. Stating that they are impossible to carry out would at the very least be inaccurate and unfounded.

Spain DC is aware of its responsibility to set the parameters that guide investment from year to year and to make projections. In view of this, we have used third-party data to estimate both direct and indirect investment in the digital infrastructure of the Madrid market and have used verified and accepted econometric models to measure the impact of that investment.

The second part of this report, which has been prepared using the same methodology as those of previous years, puts the reality of the sector into context and provides a growth estimate of the capacity of the Madrid market compared to that of the "FLAP" regions (Frankfurt, London, Amsterdam and Paris). We have made no attempt to assess these regions' growth – as they each have their own traceability and economic, political, business and investment context – but to show qualitative evidence that is not be ignored: regardless of its potential competitors (the FLAP regions), the Madrid region (and, therefore, other parts of the country too) arouses interest of sufficient scale and credibility from both domestic and international investors. Thanks to the infrastructure in the capital, the Madrid region and Spain as a whole have potential to drive a leap in quality in Spain that is at least equivalent to that of any known past industrial revolutions.

All the conclusions drawn in this report have been verified by Spain DC through a number of focus groups made up of the main representatives of the sector, all of whom are leading authorities with proven and extensive experience in this sector in Spain, particularly in Madrid, and many of whom hold positions of international responsibility.

Finally, we would like to thank DC Byte and the real estate consultancy firm CBRE for providing the market information in their possession to this Association and to the university academics in charge of producing the report.

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1 MARKET OVERVIEW

The Spanish data centre sector has recently grown significantly due to an increase in data traffic and transactions, the development of teleworking, new forms of entertainment, social media and digital platforms. Furthermore, the emergence of a new technological revolution that is giving rise to growing demand for processing capacity – artificial intelligence (AI) – is also starting to become apparent. The majority of new investments, both in existing data centres (expansions) and in new projects, include significant communication aspects related to the development of AI.

This vision seems to be unreservedly shared by both the Madrid regional government and the Spanish central government with its recent Artificial Intelligence Strategy.

The data centre sector as an enabler of digital infrastructure is in a position of leadership at this turning point in the development of the digital economy, and its actions will be decisive for the development of digitalisation, innovation and the generation of wealth. What we can say is that the development and use of AI tools will clearly be impossible without the development of data centres.

Spain continues to grow as a location for the construction of data centres. This is usually attributed to its strategic position for connecting the technological infrastructure network with the rest of the world, the availability of land, its sources of renewable energy and the saturation of other markets.

The Spanish data centre sector has undoubtedly grown since 2021, with over a hundred data centres and first-class developments in the country, and not just in Madrid or Barcelona but also in Aragón, the Valencia region and Castilla-La Mancha.

All market players are undoubtedly interested. Operators, technology and telecommunications companies, real estate companies, *SOCIMIs* (Real Estate Investment Trusts), investment funds, construction companies, electricity and gas companies, banks and public authorities are just a few of the most active examples.

This interest has led to real growth forecasts for power and connectivity reaching FLAP market levels. The consolidation of the Madrid region as a market of comparable size to Frankfurt, London, Amsterdam and Paris has many arguments in its favour, proving the sector's technical response capacity (planning, design and construction of highly efficient infrastructure, development of fibre, construction of electricity grids, etc.). When examining growth prospects, we have to consider whether Spain's industrial capabilities will grow at the same rate as demand. This uncertainty suggests that a whole other set of factors, mainly of a regulatory and bureaucratic nature, are at play.

In this category (regulatory opacity), excessive bureaucracy not only slows down the sector's achievement of its full growth potential but undoubtedly hinders its ability to reach it at all. Furthermore, imposing artificial competition conditions (for example, by placing restrictions on the growth of the electricity transmission grid or making other decisions to benefit certain areas to the detriment of technical or competitive priorities or the appetite of market players) reduces competitiveness and, ultimately, the generation of wealth and added value in this sector in Spain. The competitiveness of the Madrid region is mainly due to its population and to its high concentration of businesses, educational institutions, communications, etc. as required by digital and data industry operators. This also explains the existence of Europe's other connectivity hubs.

To date, the stipulation of artificial constraints on the growth of supply remains a matter of speculation based on the statements of public representatives reported in the media.

Madrid, which accounted for 61% of Spanish supply in 2023 (147 MW IT), remains the prime location for the development of data centres in Spain. Although Barcelona's presence has grown to 14.4% (34.9 MW IT), it should be noted that Aragón is becoming one of the most attractive regions for the development of data centres in Spain just now. With the arrival of players such as AWS, installed capacity in the region reached 37.2 MW in 2023, establishing Aragón as a new technological enclave in Spain, with possible figures of up to 111.6 MW in 2026/27 (according to data published by Microsoft). For now, all this belongs almost entirely to a single player. The recent announcement of the investment of €15.7 billion in the region, which the developer estimates will have an impact of 30% of regional GDP is beyond the scope of our study, and we will have to wait for confirmation in further reports. Other locations, such as Castilla-La Mancha, the Bilbao-Navarre corridor, Valencia, Málaga and Galicia continue to grow in terms of current and future appeal.

As for the installed capacity figures for the Madrid region for 2023, we started by adjusting the installed capacity figures at the end of 2022 from 147 MW (as forecast in the previous report) to 117 MW. We had reached the installed capacity figure of 147 MW by considering, in accordance with the estimation assumptions of other real estate consultancy firms in the sector, that all power under construction would become installed capacity the following year. In other words, we assumed that the 30 MW of power under construction declared in 2021 would become available

capacity in 2022. However, according to the updated comparison data, this was not the case. After the adjustment, and using the information provided or published by market players, we calculated an installed capacity of 147 MW in 2023, which is a growth percentage of 25.6%.

Taken as a whole, these figures suggest that projects under construction have entered the market in a more staggered way. When asked for the reason for this, several market players (in a focus group) mentioned a slowdown in the implementation of projects due to delays in obtaining various permits and authorisations from public authorities, as well as difficulty accessing the electricity transmission and distribution grids. Due to the influence of these factors, the forecasts for the sector's growth in 2023-2027 have been based on various scenarios, as shown in the relevant section of this report. We have no reason to doubt that the planned capacity or capacity under construction will become actual power, but it is our understanding that current regulations and difficulties when it comes to obtaining permits make the model more sensitive to regulatory and access difficulties. In other words, the greater the obstacles, the longer the lead time and the lower the ability to compete for projects with comparable locations in nearby countries.

With its 147 MW, Madrid remains Europe's ninth largest data centre market, boasting higher growth rates than Frankfurt, London or Amsterdam. The difference in added values between Madrid and the FLAP markets is still significant, although the (qualitative) indicators of the sector's attractiveness to investors remain at the highest levels ever seen in Spain.

Paris and Frankfurt have the highest growth figures in all FLAP markets, which should spur private and, above all, public players into action in the Spanish market.

CHALLENGES

The data centre market scenario is shaped by the need to access energy transmission networks.

A firm commitment to renewable energy remains part of Spain's strategy to address the energy crisis and has become key in terms of increasing the security of supply and achieving more affordable prices for consumers. The challenge of renewable energies has been reinforced by the publication of new targets for 2030 both domestically (according to the draft Integrated NECP 2023-2030, 48% of end-use energy and 81% of electricity generation should be from renewable energies) and, following the publication of Directive 2023/243, at European level (with a target of 42.5% of the European Union's gross final consumption of energy originating from renewable energies by 2030).

In 2023, Spain produced 77,039 MW of electricity from renewable energies, a record amount that accounted for 50.3% of all electricity generation. Renewable installed capacity has grown by 8.8% since 2022, with renewable energy installations accounting for 61.3% of Spain's electricity generation installations. Compared to other EU countries, Spain is in second position in terms of renewable installed capacity, behind only Germany (*Informe del sistema eléctrico: Informe resumen de energías renovables 2023* (Report on the Electricity System: Summary Report on Renewable Energies 2023).

The sector's competition problem is therefore not the availability of energy but the difficulty and slowness in accessing it. The rapid expansion of renewable energies is not being matched by the necessary development of grid infrastructure which, according to all the experts consulted, is seriously lacking. And that is not all. With their proven positive impact on the economy, their creation of value and their ability to drive the green transition forward, data centre projects need a specific and transparent procedure with a duration that is appropriate for the rapid transformation of the digital economy. Data centres create true demand for energy and drive the development of its generation, and they should not be subject to long procedures or made to "compete" with other consumers, such as storage facilities.

Reducing the capacity to deliver available energy to consumers slows down the arrival and implementation of new projects.

In order to reach a level of growth that places Spain on the same level as the FLAP regions, investment in electricity transmission grids and their effective execution must be increased, and all administrative procedures with local councils and regional governments must be sped up through appropriate public-private collaboration and the necessary processing transparency.

One aspect that seriously jeopardises the resolution to this problem is the failure by the Specific Amendments to the Electricity Transmission Grid Development Plan

2021-2026 approved by the Spanish Council of Ministers on 16 April 2024, which is the regulatory instrument that establishes the development needs of the electricity transmission grid for that period, to address needs of the data centre sector.

The entire sector is hoping for a rectification of this exclusion in the new version of the Electricity Transmission Plan currently in progress, and high expectations have been placed on this.

New Technology Wave: AI

Generative artificial intelligence will be one of the most disruptive advances of the next few years and one of the fields of technology with the highest short- and medium-term economic prospects (its market value could top $300 billion by 2025). As the value of AI lies in its ability to handle mind-boggling amounts of data, its impact on the data centre industry must be taken into account in the sector's forecasts for the next few years, as it could signal the start of a new paradigm in data centre management and operation.

Since the AI revolution, the sector faces challenges relating to: 1) improving data centre design and management to produce more efficient and robust energy distribution systems and advanced cooling solutions to manage the significant increase in power density; 2) taking sustainable and efficient action in response to the likely increase in energy consumption; 3) improving thermal and cooling design; and 4) designing risk management strategies and integrated security solutions.

In Spain, this industry has the highest standards of constructive and operational sustainability and efficiency and has proven that it is the only competitor that guarantees access to 100% renewable energy. The ability to both access renewable power purchase agreements (PPAs) and develop self-consumption projects arouse interest by and *in* the sector.

Other challenges apply across sectors to industry as a whole, and not just in this country. Spain must continue to provide legal certainty and available talent, streamline procurement processes and organise the presentation of its ecosystem as robust and fully capable in terms of both construction and design on the one hand and operational and customer capabilities on the other.

Spain DC's partners play a key role by making the sector robust and reliable, which in turn drives every stage of the value chain.

Regulatory compliance for environmental sustainability

In Spain and the EU, 2023 was a milestone for regulations relating to energy efficiency and environmental sustainability. The EU took a stricter approach to the regulation of carbon emissions and the promotion of renewable energies, all of

which directly affects the data centre industry. Domestically, Spain proactively adopted policies aligned with these European guidelines.
Some of the regulations affecting the sector are:

1. Directive (EU) 2023/1791 of the European Parliament and of the Council on energy efficiency.

2. Royal Decree-Law 8/2023 adopting measures to address the economic and social consequences of the Ukraine and Middle East conflicts and to mitigate the consequences of the drought.

3. Spanish Integrated National Energy and Climate Plan (Integrated NECP).

4. Circular on Access to Energy issued by the Spanish Markets and Competition Commission (CNMC).

The sector has been promoting this regulation and maintaining standards that go above and beyond it and that have led to the EU Green Data Centre Pact, providing proof of its leadership in the field of sustainability.

Now, the EU through its Implementing Regulation and the Spanish Government through its legislation transposing the Energy Efficiency Directive must prove their commitment to a sector that is key to both Europe's and Spain's competitiveness over the next few decades.

Collaboration between the Spanish Government, businesses and other key players (see the strategic planning to adapt to regulatory changes) will be essential if these challenges are to be addressed effectively.

The transposition of the EU Directive known as the Energy Efficiency Directive, as well as the Royal Decree announced by the Spanish Government, must be designed to benefit the common market rather than create a fragmented market.

The lack of clarity in many of the Directive's requirements not only risks its failure but can also lead to unfair competition both within the single market and against competitors such as the United States, Africa and Asia. This has already happened in other sectors due to overregulation. Spain must lead by example in promoting a competitive industry, enabling service providers to **remain** at the forefront of sustainability without restrictions or obligations that would go against the interests of Spanish people and businesses, because placing obstacles for data centres is a barrier against digitalisation and the green transition.

The International Context

The development of the sector in Spain must be examined in the context of the major European markets, with which Madrid as a region and Spain as a whole aspire

to compete. The first fact we have noted is that all European markets are addressing the complexity involved in accessing electric power, as can be seen in all local and international forums and other spaces for discussion.

The FLAP markets as a set are continuing to experience strong growth, although this has not reduced interest in Madrid and Spain, something that, at least for now, has not happened. **The analysts we consulted expect considerable growth in these markets in the medium term (3-5 years). The same analysts also forecast significant growth for the Madrid market, without apparently making any distinctions based on the relevance of access to energy and regulatory ease**. Spain DC again lacks the necessary evidence to make a judgement on the growth of the competitive markets, although we have observed that any trend – including those of the FLAP regions – must be carefully examined.

Spain – and Madrid in particular – must bear in mind that **there will ultimately be competition between the main investment destinations** and that this will be resolved by using decision matrices based on many factors. And, although none of them should be ignored, access to energy and shorter and more transparent regulatory procedures will increasingly act as a differentiating factor on which all Spanish authorities – regional, local and national – must work together.

Talent Creation

Training and retaining data centre industry specialists is still a major challenge for the sector. As already noted in previous reports, according to data from the Uptime Institute, 300,000 new industry specialists will be needed by 2025. Their qualifications and the need for them to be able and willing to work on emerging trends must be addressed from various points of view. Firstly, it is essential to create more synergies between companies in the sector and universities and specialist schools. Secondly, the sector must set strategies to attract talent to the industry taking into account aspects such as appropriate salary policies, the design of retention plans, continuous training and the possibility of hybrid or remote working environments.

2 MADRID, A HYPERCONNECTIVITY HUB FOR SPAIN

In 2023 Madrid reached an installed capacity of **147 MW**, 25.6% more than in 2022. In must be noted that this growth was calculated with an adjusted 2022 installed capacity figure for Madrid due to the slowdown in the execution of **30 MW.** After consulting various sources, the main cause was found to be difficulties with supply and procedures.

INSTALLED CAPACITY (MW)

		2021	2022	2023
Madrid	SPAIN DC Report Q4/2022	103	185 (p)*	294 (p)**
	SPAIN DC Report Q1/2023***		147 ***	318 (p) ***
	SPAIN DC Report Q1/2024		117 (updated)	147
	Increase in IT power			25.6%
	Increase in IT power (MW)			30

* Projection calculated as: installed capacity in 2021 + capacity under construction (based on data provided by CBRE)

* Projection calculated as: installed capacity in 2022 + 25% pipeline capacity (based on data provided by CBRE)

*** Data from Q4 2022 calculated as: installed capacity in 2021 (based on SPAIN DC data) + 30 MW of capacity under construction

The sector's dependence on **decisions by public authorities** and on energy efficiency and environmental sustainability regulations, as well as on the capacity of infrastructure to meet energy needs, has led to a number of possible scenarios for the 2022-to-post-2026 forecasts. The aim of these scenarios is to consider various possible ways in which the sector could evolve based on different rates of progress.

The four scenarios envisaged, as well as the methodology used for each of them, are shown below. The following should be noted in order to interpret them correctly:

- All the scenarios are feasible, and no variables to establish likelihoods of occurrence were available. Probabilisation would only be possible if we had information on both the future progress of regulatory matters and the decisions to be taken by the affected operators. This information was not available to us.

- Despite the uncertainty surrounding the evolution of some variables that are relevant for the sector, we decided to provide a breakdown of the projected power by year from 2025. The methodology used for the projections involved a rigorous process. In any case, the future of the sector can be analysed by focusing on the final overall figure without looking at the breakdown by period.

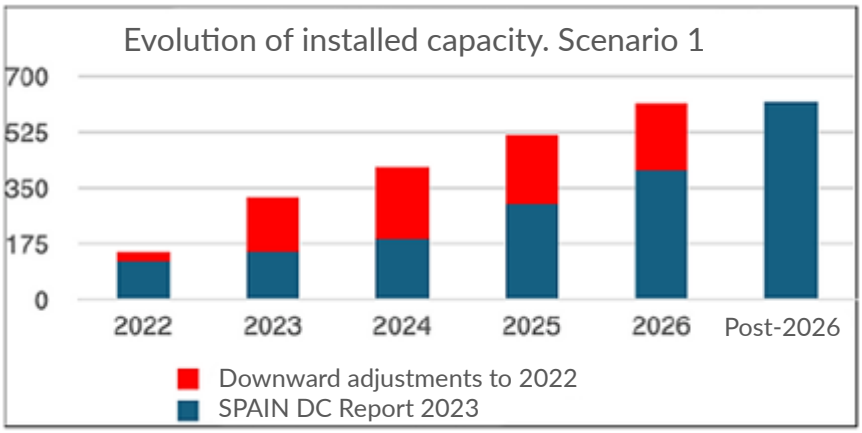
- There is no point attempting to make projections beyond 2026-2027, particularly without knowing what will be decided regarding the easing of local and regional procedures or what developments to the electricity transmission grid or to the Royal Decree (the Data Centre Law), whose scope and content are unknown as at the date of this report, will be planned by the central Government.

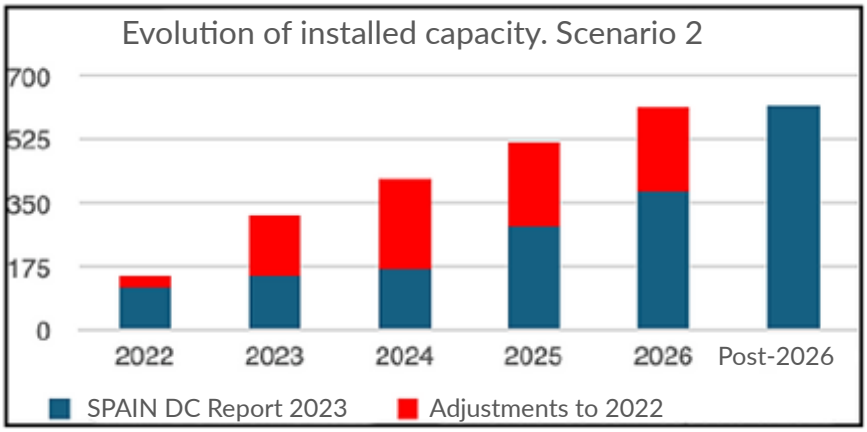
Scenarios		2023	2024	2025	2026	Post-2026 (2027-2030)
1	Business-as-usual scenario: Under Scenario 1, predictions continue as in previous reports in order to establish the real figure's deviations from the forecast. All UC power is imputed to 2024 and pipeline power is imputed on a straight-line basis over four years.	Installed capacity in 2023 based on information obtained by SPAIN DC	Installed capacity in 2023 based on information obtained by SPAIN DC	Installed capacity in 2024 + 25% Forecast	Installed capacity in 2025 + 25% Forecast	Installed capacity in 2026 + 50% Forecast
2	Hyperregulation scenario: Under Scenario 2, UC power is executed more slowly and now corresponds to two years. Pipeline power corresponds to four years but taking into account the difference between Committed MW and Early Stage MW to calculate their respective percentages.	Installed capacity in 2023 based on information obtained by SPAIN DC	Installed capacity in 2023 + 50% UC	Installed capacity in 2024 + 50% UC + 50% Short-term forecast	Installed capacity in 2025 + 50% Short-term forecast	Installed capacity in 2026 + 100% Long-term forecast
3	Hostile scenario: Under Scenario 3, UC power is imputed as in Scenario 2. It also takes into account the difference between Committed MW and Early Stage MW but slows down the Committed power imputation.	Installed capacity in 2023 based on information obtained by SPAIN DC	Installed capacity in 2023 based on information obtained by SPAIN DC	Installed capacity in 2024 + 50% UC + 25% Short-term forecast	Installed capacity in 2025 + 50% Short-term forecast	Installed capacity in 2026 + 25% Short-term forecast + 100% Long-term forecast
4	Good scenario: Under Scenario 4, all UC power is imputed for 2024 (just like Scenario 1). Pipeline power corresponds to four years, but with 800 MW executed in 2027-2030. These actions can be included in this scenario thanks to the information available to Spain DC regarding its financial and technical solvency and as a result of the possibility of execution.	Installed capacity in 2023 based on information obtained by SPAIN DC	Installed capacity in 2023 + UC	Installed capacity in 2024 + 25% Forecast	Installed capacity in 2025 + 25% Forecast	Installed capacity in 2026 + 50% Forecast + Confidential

UC = power under construction

INSTALLED CAPACITY (MW)

			2021	2022	2023	2024	2025	2026	Post-2026 (2027-2030)	Increase from 2023 to post-2026	Average increase from 2023 to post-2026
Madrid	SPAIN DC Report 2021		103	185	294	403	512	621			
	SPAIN DC Report 2022		103	147	318	416	515	613			
	SPAIN DC Report 2023	Scenario 1		117	147	190	297	404	619		
		Scenario 2		117	147	168	286	382	619		
		Scenario 3		117	147	168	238	334	619		
		Scenario 4		117	147	272	355	437	1,320		
	Increase in IT power (%)	Scenario 1			25.6%	28.9%	56.6%	36.2%	53.1%	320.9%	43.2%
		Scenario 2			25.6%	14.5%	69.8%	33.7%	62%		
		Scenario 3			25.6%	14.5%	41.2%	40.5%	85.3%		
		Scenario 4			25.6%	85.1%	30.3%	23.3%	201.9%	797.8%	73.1%
	Increase in IT power (MW)	Scenario 1			30.0	42.5	107.3	107.3	214.6	471.7%	
		Scenario 2			30.0	21.3	117.5	96.2	236.7		
		Scenario 3			30.0	21.3	69.3	96.3	284.8		117.9
		Scenario 4			30.0	125.1	82.5	82.6	882.5	1,172.7	293.2


Evolution of installed capacity. Scenario 1
700
525
350
175
0
2022
2023
2024
2025
2026
Post-2026
Downward adjustments to 2022
SPAIN DC Report 2023


Evolution of installed capacity. Scenario 2
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175
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2022
2023
2024
2025
2026
Post-2026
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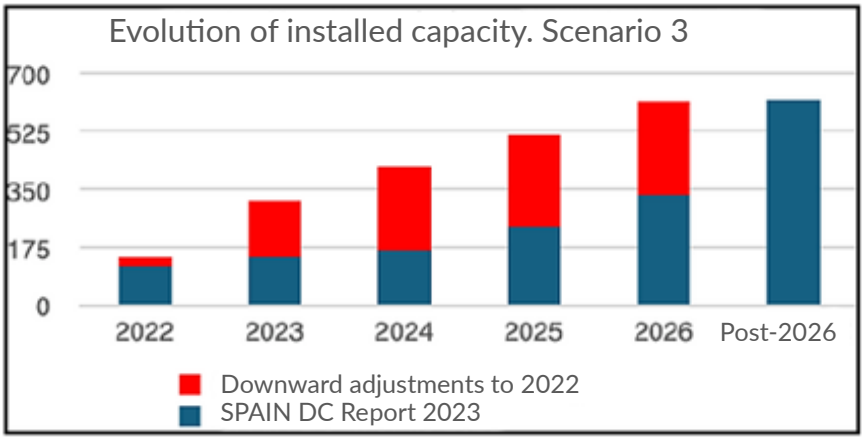
Adjustments to 2022


Evolution of installed capacity. Scenario 3
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175
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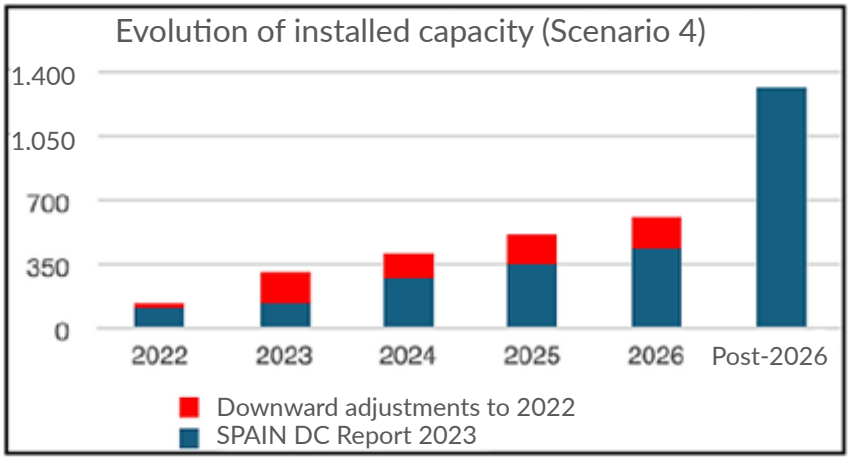
2022
2023
2024
2025
2026
Post-2026
Downward adjustments to 2022
SPAIN DC Report 2023


Evolution of installed capacity (Scenario 4)
1.400
1.050
700
350
0
2022
2023
2024
2025
2026
Post-2026
Downward adjustments to 2022
SPAIN DC Report 2023

The many factors that can lead to one or other scenario depend on:

- Public authorities: permits, licences and simplification of processes; international promotion of the region and collaboration with the private sector.

- The digital economy: evolution of investment and use of AI, development of AI in Spain and in Spanish, digitalisation of the grassroots economy, electrification and digitalisation of industry, attraction of digital service hosting and provision to Spain.

- Energy: planning the electricity grid, promoting the connection of data centres as real energy demand, increasing the system base load, investing in networks, real execution of the investment.

3 ECONOMIC IMPACT

INVESTMENT IN DIGITAL INFRASTRUCTURE

The European Commission has been overseeing member states' progress and publishing the Digital Economy and Society Index report (which is currently included in the Report on the State of the Digital Decade) since 2014. In 2023 Spain was positioned as follows in each area:

Digital Skills: Spain was above the EU average in terms of basic digital skills (64% of the population) and ICT graduates (4.8%). However, Spain was slightly below the European average (4.3% compared to 4.6%) for percentage of ICT specialists.

Digital Infrastructure: In terms of digital infrastructure, Spain had made significant progress. Its coverage of high-capacity fixed (93%) and fibre (91%) networks was well above the European average (73% and 56% respectively). In addition, 5G coverage in Spain was slightly above the EU average (82%, compared to the EU's 81%).

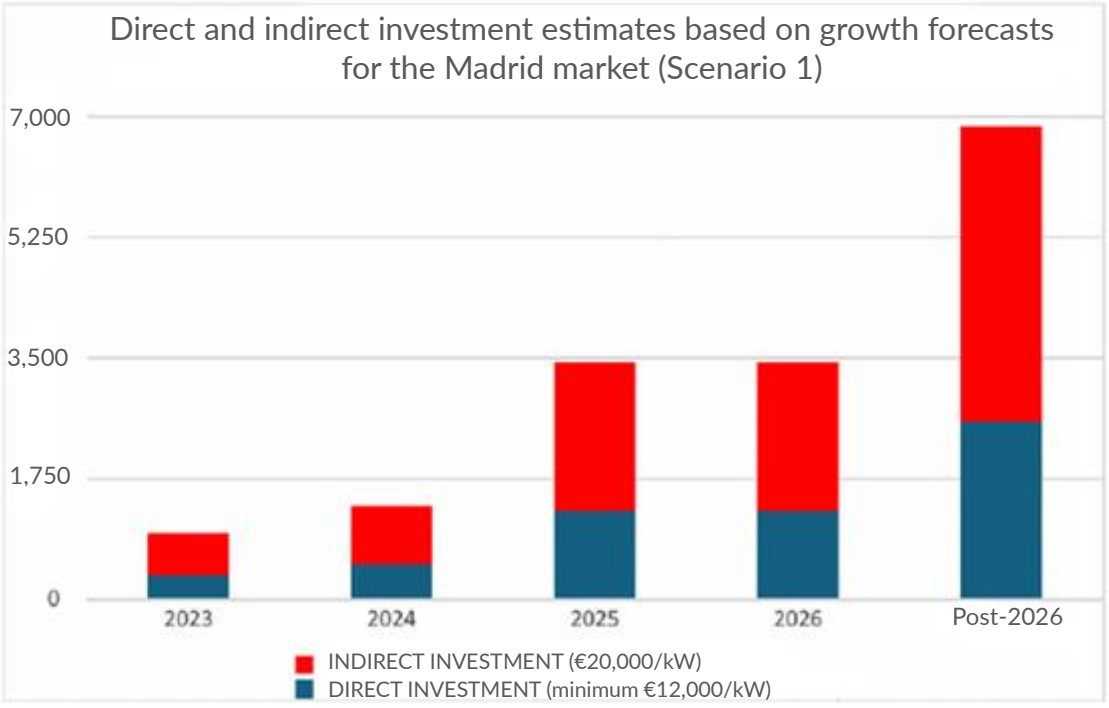
Digitalisation of Companies: Spain lagged slightly behind the EU average in basic digital intensity (68% compared to the EU's 69%). It also had lower rates of big data (9% compared to 14%) and cloud (27% compared to 34%) adoption, although its artificial intelligence figures are expected to reach EU levels (8%).

Digitalisation of Public Services: Spain stood out in the EU for its digital public services and e-government. Citizen interaction with e-government (84%), the reuse of information (83%) and access to electronic medical records (83%) were significantly above the European average. This is attributed to the Government's digitalisation strategy, although administrative decentralisation presents challenges regarding the interoperability of digital services at every level of government.

In the scenarios in which Madrid reaches 616 MW of installed capacity from 2026 onwards (Scenarios 1-3), the cumulative direct investment in digital infrastructure up to that moment could exceed €6 billion. An indirect investment of at least €10.034 billion should be added to this (see Annex 1).

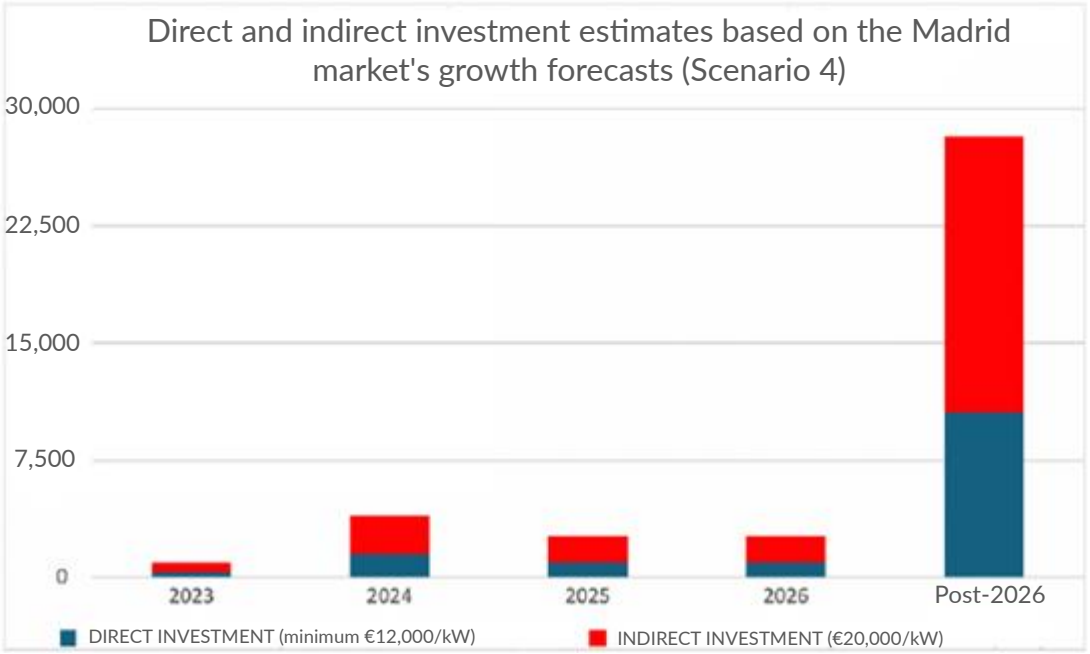
	Investment in digital infrastructure (business-as-usual scenario)						
	2022	2023	2024	2025	2026	Post-2026 (2027-2030)	OVER 5 YEARS (2023 to post-26)
ANNUAL INCREASE IN MW		30	43	107	107	215	
MW (Scenario 1)	**117**	**147**	**190**	**297**	**404**	**619**	
DIRECT INVESTMENT (minimum €12,000/kW)		360	510	1,288	1,288	2,575	6,020
INDIRECT INVESTMENT (€20,000/kW)		600	850	2,146	2,146	4,292	10,034

Figures shown in millions of euros



Figures shown in millions of euros

If you assume that Scenario 4 occurs and that the planned MW can be executed, direct investment could exceed **€14.4 billion**, to which an indirect investment of **€24 billion** would have to be added. It must be emphasised that this is not a best-case scenario but a realistic scenario in which public authorities fulfil their obligations strictly and on time and none of the targets involve an increase in public spending that could have the effect of restricting investment.

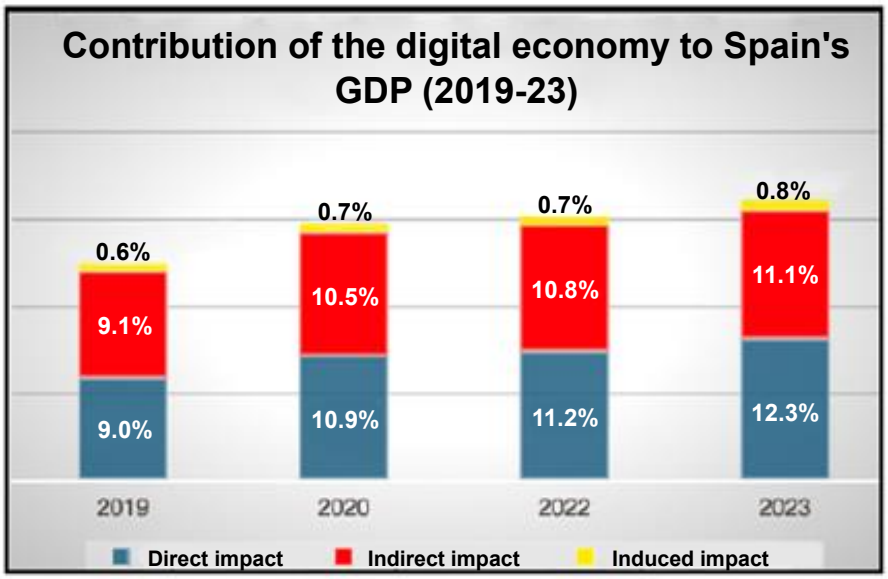


Figures shown in millions of euros

STIMULATING THE ECONOMY

A stimulator of the Spanish economy

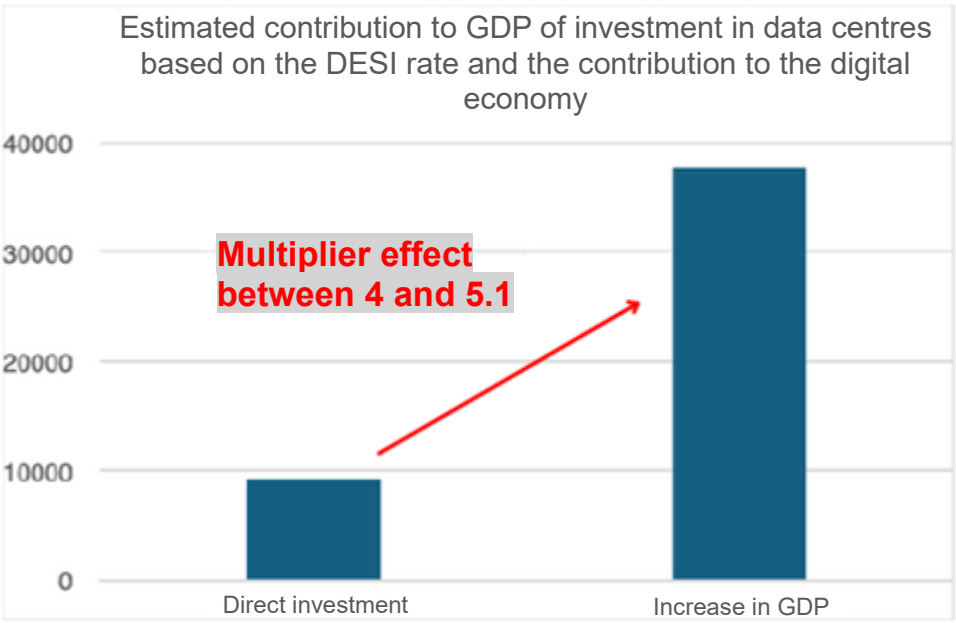
Spain DC used econometric models to analyse the impact of digital infrastructure investment on GDP. This is based on the recognition of data centres' position as the backbone of digital infrastructure. As highlighted in previous reports, data centres are the cornerstone of both the hardware and the software of the digital economy. According to data from the Spanish Association for the Digital Economy (Adigital), in 2023 the digital economy, defined as all economic activity based on digital goods and services, accounted for 24.4% of the country's Gross Domestic Product (GDP), up 1.5 percentage points from the previous year (22.7%) and 2.1 percentage points from 2020 (22.1%). This constant increase in its contribution to the country's GDP confirms the development of data centres as a key driver of economic growth.



Looking at the evolution of the DESI (Digital Economy and Society Index) rate, investment in digitalisation, whose main driver is the development of data centres, can contribute €37.834 billion to Spain's GDP by 2026. This is a 2.6% increase in GDP as a result of digital investment*.

As Madrid has a cumulative direct investment in data centres of €6.020 billion (between 65% and 80% of all direct investment in Spain) – Scenarios 1-3 – the multiplier effect would be €4-5.1 per euro invested.

* Previous reports estimated its impact on GDP at €59.954 billion. This review addresses a change in one of the variables, the DESI, according to the most recent Report on the State of the Digital Decade and the percentage in IT potential accounted for by Madrid as a percentage of Spain (see Annex 2).



A stimulator of the Madrid economy

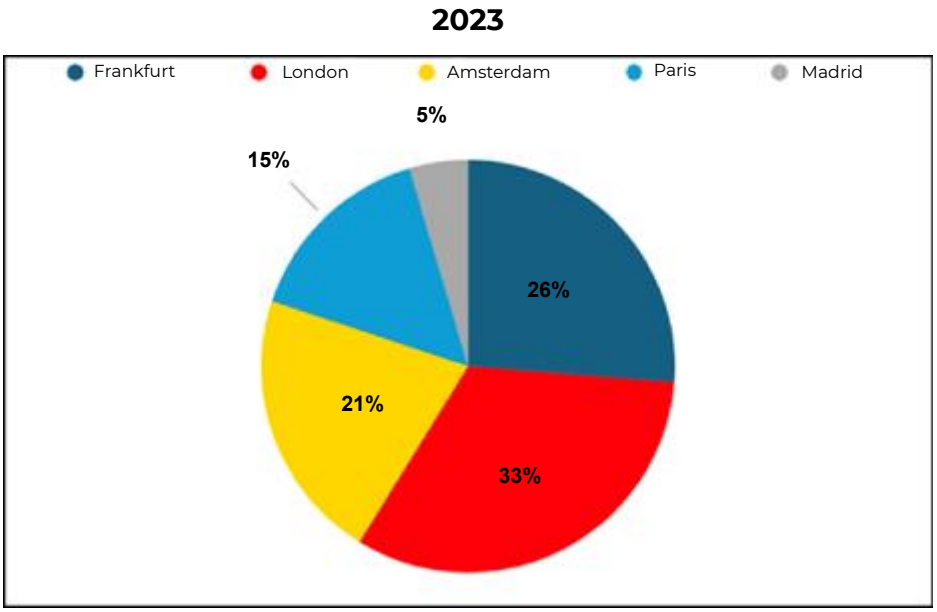
The Madrid region's GDP accounts for 19.4% of the country's GDP, which means that it could increase by up to €7,339 billion as a result of digital investment.

4 FLAP VS MADRID COMPARISONS

The FLAP markets accounted for a capacity of 3,050 MW in 2023. Madrid's 147 MW was equivalent to 17.5% of the Frankfurt market, 14.2% of the London market, 21.5% of the Amsterdam market and 30.1% of the Paris market.

If we included Madrid in the FLAP markets, it would account for 5% of total installed capacity.

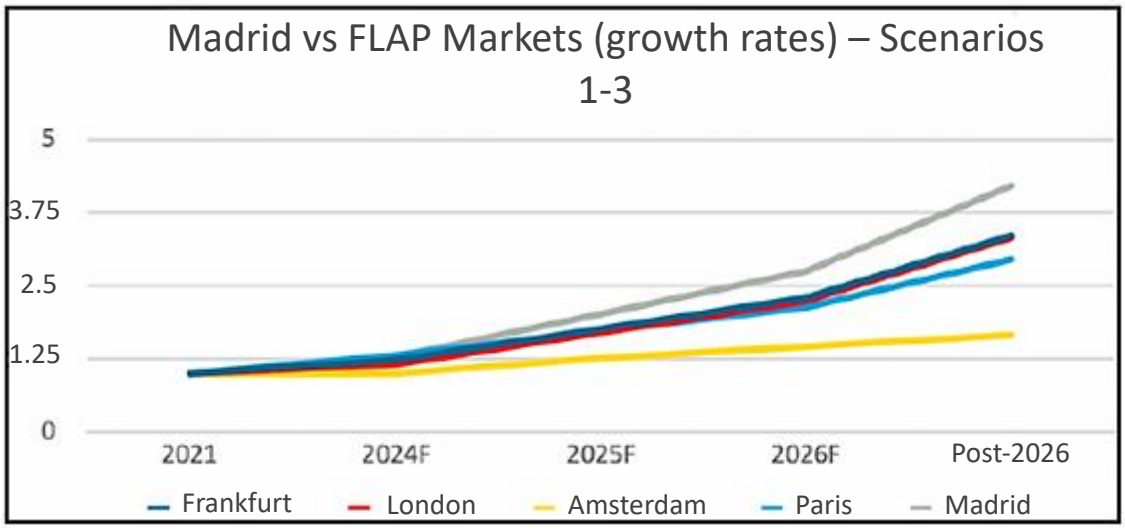
	Total Installed Capacity (MW 2023)
Frankfurt	839
London	1,041
Amsterdam	681
Paris	489
Madrid	147

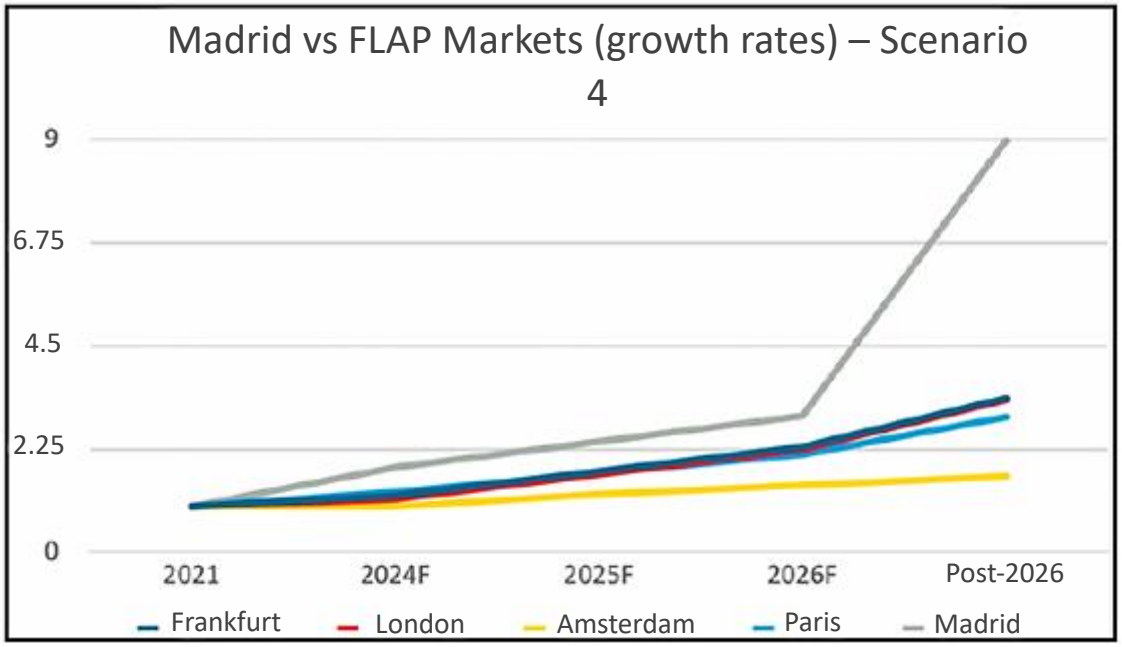


			2022	2023	2024 (forecast)	2025 (forecast)	2026 (forecast)	Post-2026 (2027-2030)	Increase from 2023 to post-2026	Average increase from 2023 to post-2026
Frankfurt	**SPAIN DC Report 2021**		594	044	1,094	1,344	1,594			
	SPAIN DC Report 2022		704	843	1,020	1,198	1,375			
	SPAIN DC Report 2023		704	839	1,034	1,480	1,927	2,819		
	Increase %				23.2%	43.2%	30.2%	46.3%	236.0%	35.4%
	Increase in IT power				195	446	446	893	1,980	495
London	**SPAIN DC Report 2021**		1,132	1,358	1,585	1,811	2,037			
	SPAIN DC Report 2022		962	1,132	1,351	1,570	1,789			
	SPAIN DC Report 2023		956 rev	1,041	1,206	1,770	2,333	3461		
	Increase %				15.8%	46.8%	31.9%	48.3%	232.5%	35.0%
	Increase in IT power				165	564	564	1,128	2,420	605
Amsterdam	**SPAIN DC Report 2021**		707	771	836	900	948			
	SPAIN DC Report 2022		643	684	727	769	812			
	SPAIN DC Report 2023		616.3 rev	681	681	860	994	1,128		
	Increase %				0.0%	26.3%	15.6%	13.5%	65.6%	13.5%
	Increase in IT power					179	134	134	447	112
Paris	**SPAIN DC Report 2021**		397	480	563	645	728			
	SPAIN DC Report 2022		380	538	650	762	874			
	SPAIN DC Report 2023		374 rev	489	642	842	1,042	1,442		
	Increase %				31.4%	31.1%	23.7%	38.4%	194.9%	31.0%
	Increase in IT power				153	200	200	400	953	238
Madrid	**SPAIN DC Report 2021**		185	294	403	512	621			
	SPAIN DC Report 2022		147	318	416	515	613			
	SPAIN DC Report 2023	**Scenario 1**	**117**	**147**	**190**	**297**	**404**	**619**		
		Scenario 2	**117**	**147**	**168**	**286**	**382**	**619**		
		Scenario 3	**117**	**147**	**168**	**238**	**334**	**619**		
		Scenario 4	**117**	**147**	**272**	**355**	**437**	**1,320**		
	Increase in IT power (%)	**Scenario 1**		25.6%	28.9%	56.6%	36.2%	53.1%		
		Scenario 2		25.6%	14.5%	69.8%	33.7%	62.0%	320.9%	43.2%
		Scenario 3		25.6%	14.5%	41.2%	40.5%	85.3%		
		Scenario 4		25.6%	85.1%	30.3%	23.3%	201.9%	797.8%	73.1%
	Increase in IT power (MW)	**Scenario 1**		30.0	42.5	107.3	107.3	214.6		
		Scenario 2		30.0	21.3	117.5	96.2	236.7	471.7	117.9
		Scenario 3		30.0	21.3	69.3	96.3	284.8		
		Scenario 4		30.0	125.1	82.5	82.6	882.5	1,172.7	293.2

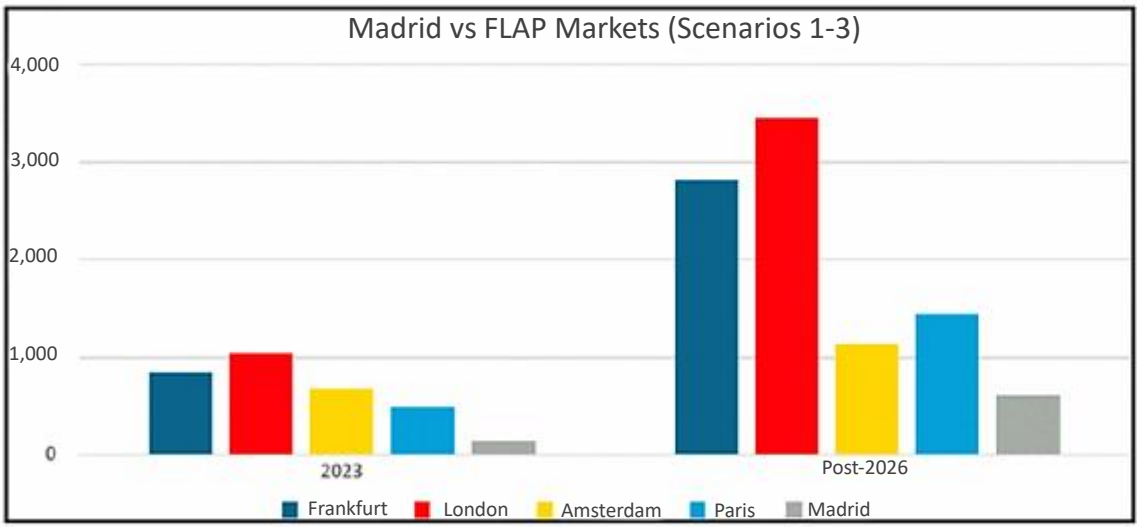
	MAX. ANNUAL GROWTH 2018-2023	GROWTH 2018-2023	AVERAGE GROWTH 2018-2023
Frankfurt	139 (2021)	166.3%	21.6 %
London	145 (2019)	86.2%	13.2%
Amsterdam	173 (2021)	130.9%	18.2%
Paris	115 (2023)	167.2%	21.7%

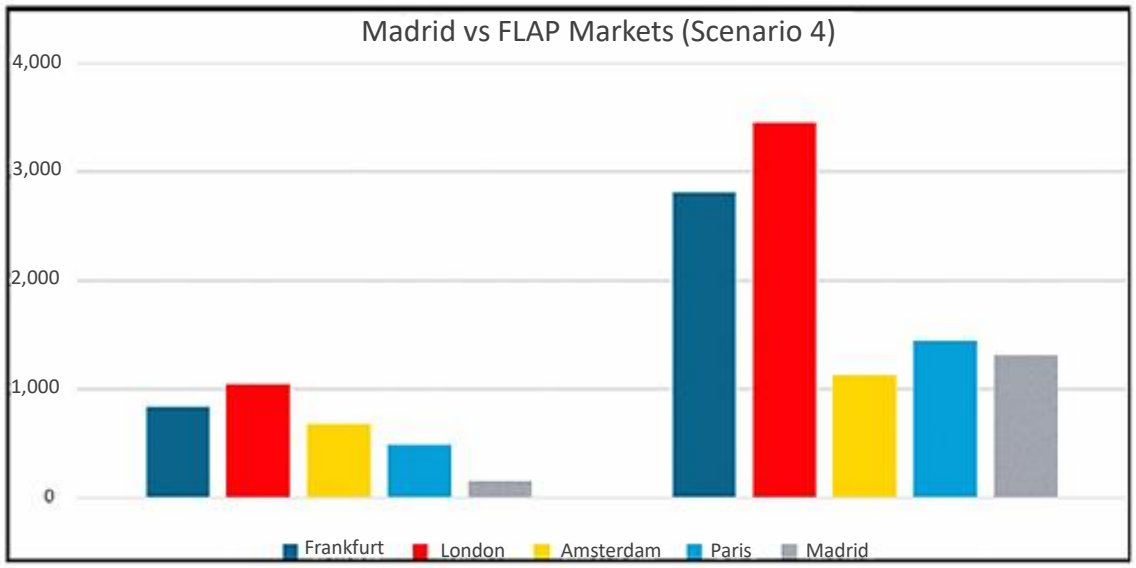
In 2018-2021, none of the FLAP countries saw a higher average growth than that seen in the Madrid market for the period between 2023 and post-2026. As for 2021-2023, Madrid still has the highest growth rates.





In Scenarios 1-3, Madrid still lags behind FLAP installed capacity levels but, if the government takes appropriate action and the opportunities of the sector are properly used, Madrid could overtake markets such as Amsterdam and Paris in 2027-30.


Madrid vs FLAP Markets (Scenarios 1-3)
4,000
3,000
2,000
1,000
0
2023
Post-2026
Frankfurt
London
Amsterdam
Paris
Madrid


Madrid vs FLAP Markets (Scenario 4)
4,000
3,000
2,000
1,000
0
Frankfurt
London
Amsterdam
Paris
Madrid

ANNEX I

Methodology used in Section 3: Investment in digital infrastructure

The charts in Section 3 (investment in digital infrastructure) have been taken from the following table, which was drawn up using the estimates of Section 2 above and the information provided by SPAIN DC, according to which direct investment (including investment in land+power+construction) has an estimated cost of €12-16/kW. In addition, there is also indirect investment, which includes the value of the assets hosted in data centres' hardware (computer equipment; network, security or storage equipment) and software (licences and investment in the development of the systems housed in the hardware), as well the operation and maintenance of all this equipment (outsourcing companies, integrators, installers, cybersecurity, etc., with an estimated cost of €20 billion/kW (Spain DC).

	Investment in digital infrastructure (business-as-usual scenario)						
	2022	2023	2024	2025	2026	Post-2026 (2027-2030)	OVER 5 YEARS (2023 to post-26)
ANNUAL INCREASE IN MW		30	43	107	107	215	
MW (Scenario 1)	**117**	**147**	**190**	**297**	**404**	**619**	
DIRECT INVESTMENT (minimum €12,000/kW)		360	510	1,288	1,288	2,575	6,020
INDIRECT INVESTMENT (€20,000/kW)		600	850	2,146	2,146	4,292	10,034

Figures shown in millions of euros

ANNEX II

Methodology used in Section 3: Stimulating the Spanish and Madrid economies

In order to examine the impact on GDP of investment in the data centre industry, we have used econometric models that analyse the relationship between digitalisation and the creation of wealth[1]. These models show a direct relationship between digitalisation and GDP growth such that it is estimated that a 10% increase in the DESI (Digital Economy and Society Index)2 digitalisation index causes the GDP to increase by one percentage point (as done in similar studies, this impact has been increased to 1.294 as a result of the increase in the impact of the digital economy on GDP – Adigital, April 2024). Based on the following information and assumption:

1) GDP (in billions of euros) in 2023: 1.461880 (Source: Spanish National Institute of Statistics, INE). Assuming a conservative position, we have taken this to be constant.

2) DESI index (European Commission). Based on the expected results of Spain's digitalisation plans and the trend in the index, we have assumed an increase of 20% for this index.

We have estimated an increase of €37.834 billion in Spain's GDP.

1. Various approaches can be taken when it comes to analysing the contribution of the data centre industry to the creation of wealth. One of the options proposed by Deloitte in its report "*El impacto de la digitalización en España*" ("The Impact of Digitalisation in Spain") (2019) based on Bruegel et al. (2019), links the digitalisation of the country (as reflected in the European Commission's Digital Economy and Society Index, DESI) to economic growth (as represented by Gross Domestic Product). According to the European Commission's report "Digital Economy and Society Index 2021", the DESI index shows an upward trend for Spain above the EU average.

2. The Digital Economy and Society Index (DESI) is an indicator that measures the performance and evolution of EU Member States' digital competitiveness on an annual basis. It does this based on five dimensions: Digital Public Services, Connectivity, Use of Internet Services, Human Capital and Integration of Digital Technology.

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