Spain Data Center

REPORT Q4 2021

Colegio de Economistas de Madrid

SPAINDC
ASOCIACIÓN ESPAÑOLA DE DATA CENTERS

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This report has been commissioned by SPAINDC, the Spanish Data Center Association, which owns this report for all legal purposes. The report was produced with the collaboration of the Madrid Economists Association, as detailed in the Collaboration Agreement of December 1, 2021 between both organizations.

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SPAIN DATA CENTER REPORT Q4 2021

This study commissioned by SPAINDC, the Spanish Data Center Association, aims to provide a quantitative description of the data center market in Spain.

This report aims to provide an overview of this market and its evolution in Spain, as well as of the direct and indirect ways in which the data center industry impacts the Spanish economy.

The report has been produced based on a combination of reports published by consulting firms independent of SpainDC. When it has not been possible to obtain accurate sources of information or when the existing sources have been deemed inaccurate compared to the observed reality, we have sought the expert opinion of the associates and partners of SPAINDC.

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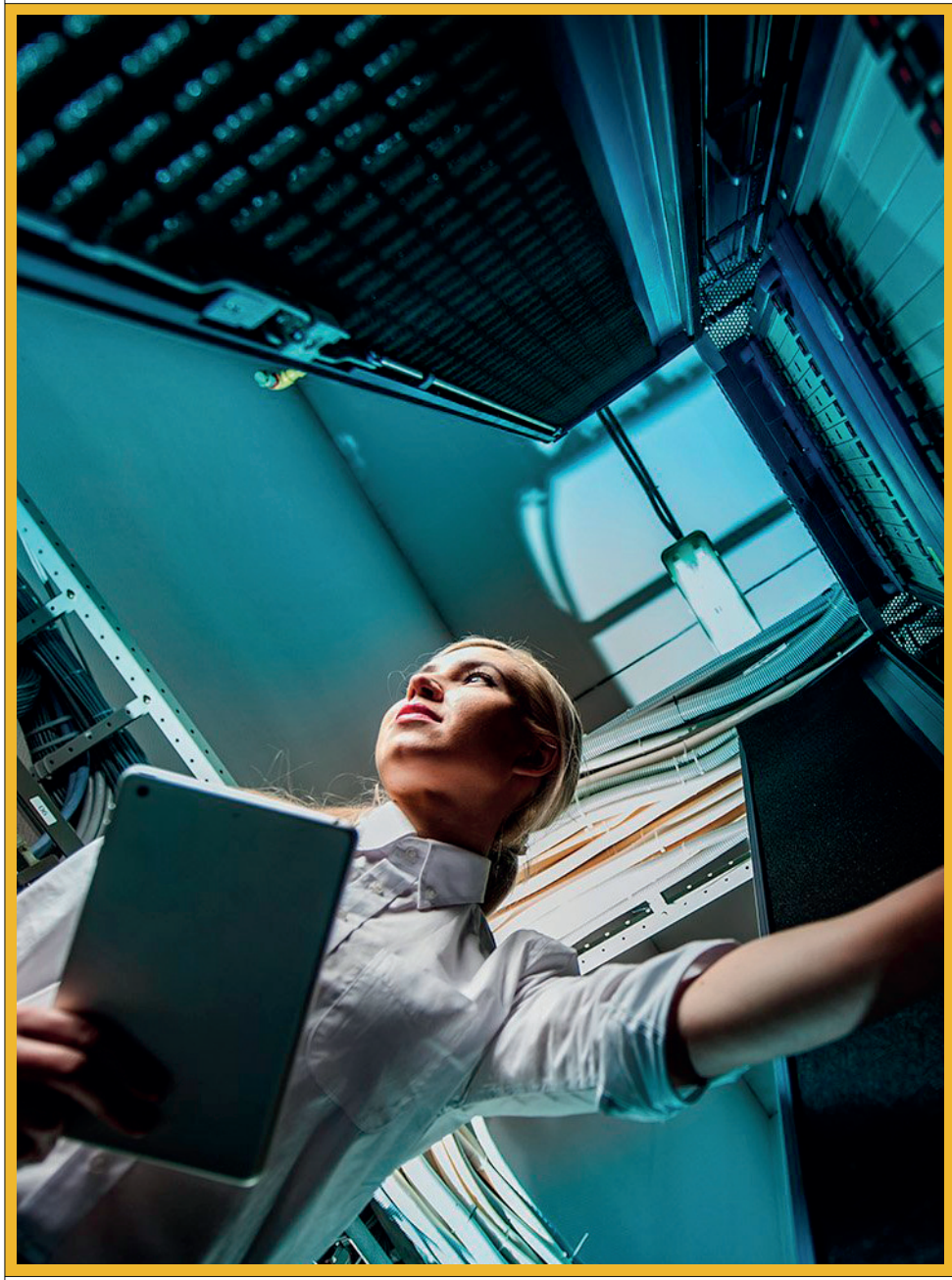


01

Strategic moment and positioning

The Data Center industry should be recognized as a key sector for developing an active digital economy capable of creating jobs, attracting investment and retaining talent; ultimately, it must be capable of creating wealth and pushing all the vectors of digital transformation: cloud services, big data, omnichannel retailing, cybersecurity, artificial intelligence, blockchain technology and the connection between networks and systems.

1: Digital infrastructure refers to the set of fixed and mobile networks, data centers, cloud and hosting service providers, internet exchange points, and content distribution networks.
2: Based on current real information when the report was produced (corroborated by industry specialists), the hub in Madrid accounts for approximately 91% of Data Center market in Spain. Based on the data gathered from the following reports: Data Centers European Research Report. Q3 2021 (Knight Frank) and the Global Data Center Market Comparison.
Based on the Global ranking 2022 (Cushman & Wakefield), the Madrid market in Q4 2021 would total an IT power of 103 MW, so the total for Spain would be 113 MW.

At a time when digital infrastructure centers are growing[1], **Spain has a capacity of approximately 113 MW in Q4 20212**[2]. Thanks to its digital development as well as the investment made by the largest technology providers, Spain is in a leading position in the South of Europe, making progress to become a **hub of data centers that "competes" with the European "top tier".**

Some of the milestones that strengthen Spain's position, from the point of the offerings, include:

1 /// Deployment of large public cloud infrastructures by Google, Oracle, IBM, Microsoft and Amazon,

2 /// Strengthening international connections and improving its strategic positioning thanks to three new networks of underwater cables that will connect Spain and the Americas (Grace Hooper and EllaLink) and the African continent (2Africa),

3 /// Increase in the capacity of digital infrastructure providers and

4 /// Redistribution of investment in the European centers.

From the demand point of view, the following should be highlighted:

1 /// the acceleration of the digital transformation of companies as a result of the COVID-19 crisis,

2 /// he development of digital services.

Since **Madrid consolidated its position in Q4 2021 as the biggest node in Spain** (since it accounts for approximately 91% of the total capacity), this section will focus on analyzing the evolution of the Madrid market, as well as its position in relation to other markets, particularly the FLAP markets.

MADRID vs FLAP MARKETS Q3 2021

F Frankfurt
499 MW

L London
940 MW

A Amsterdam
650 MW

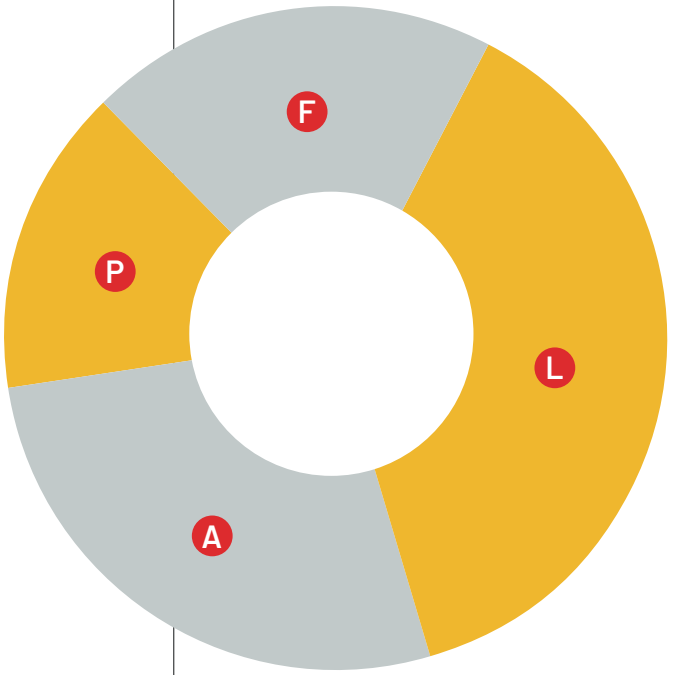
P Paris
376 MW

M **MADRID**
103 MW

Madrid operates in the EMEA region (Europe, the Middle East and Africa), competing with the four biggest markets of data centers in Europe, which are London, Amsterdam, Frankfurt and Paris (known as FLAP markets). These 4 markets represented 2,465 MW of capacity (Built IT power[3]) in Q3 2021.
Comparatively, in that same year, Madrid's capacity was of 103 MW, which amounts to 10.9% of London's capacity, 15.8% of Amsterdam's capacity, 20.6% of Frankfurt's capacity, and 27.4% of Paris' capacity.

3: Definition of IT Power: measure of the power / capacity of a data center or market

FLAP MARKET DISTRIBUTION Q3 2021



Frankfurt
20 %

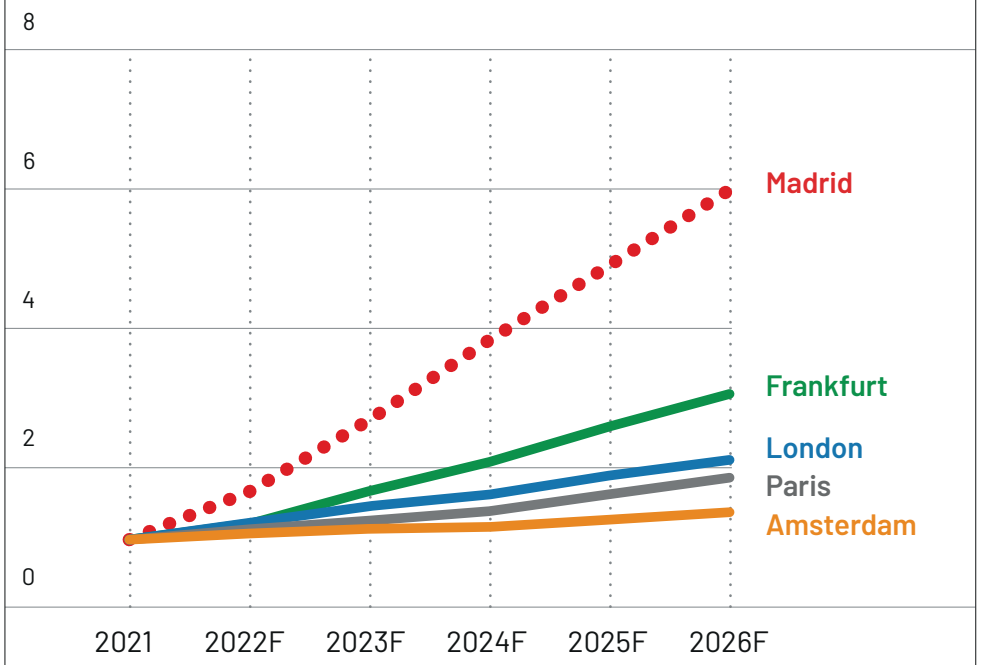
London
38 %

Amsterdam
27 %

Paris
15 %

MARKET GROWTH IN TERMS OF CAPACITY (MW BUILT IT POWER) MADRID vs FLAP MARKETS

Accumulated growth of the market capacity (MW Built IT Power). MADRID vs FLAP Countries 2021-2026F

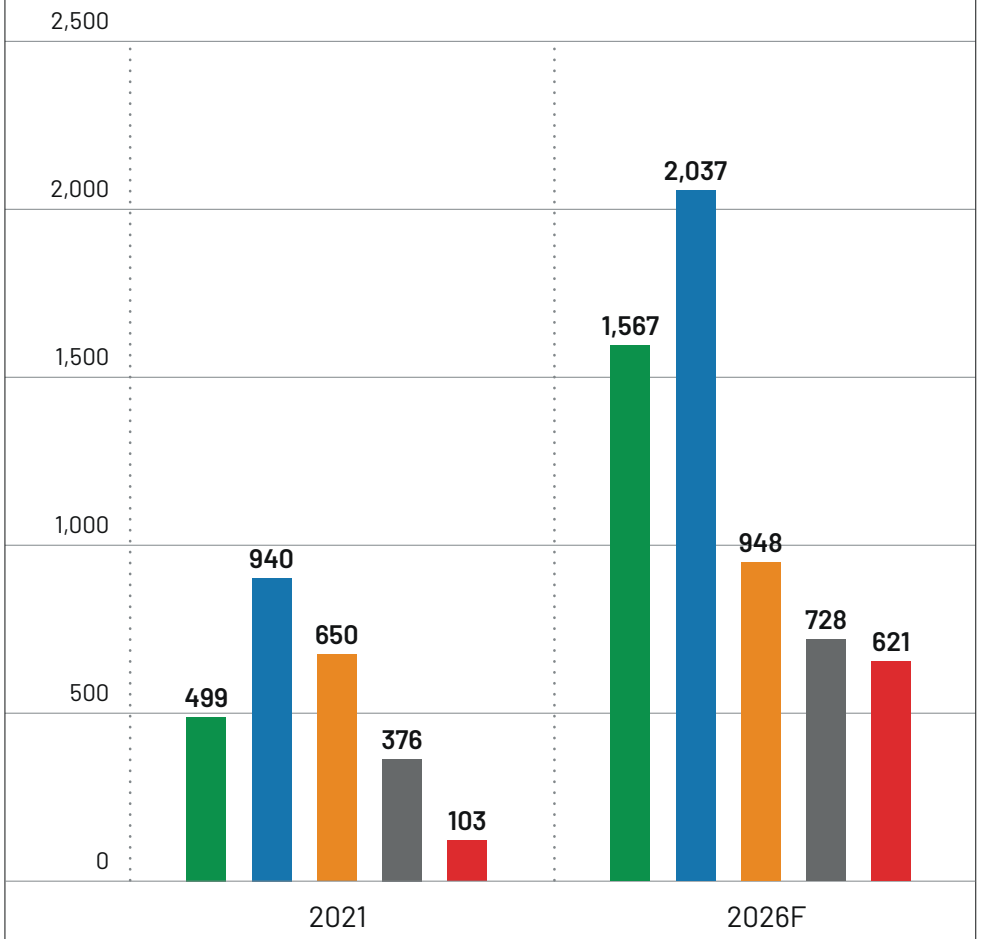


Source: prepared in-house based on the report: Data Centers European Research Report. Q2 2020 and Q3 2021. Knight Frank // Global Data Center Market Comparison. Global ranking 2022. Cushman & Wakefield (see annex 1).

	Average growth rate 21-26F (%)
London	16.73
Frankfurt	26.15
Paris	14.13
Amsterdam	7.85
MEDIA	**16.58**
Madrid	43.24

The expected growth of the four FLAP markets (in terms of capacity) will reach 5,307 MW (Built IT Power) in 2026F.
This represents an average growth rate of 16.58% (FLAP). The expected growth of Madrid is significantly higher, potentially reaching an average growth rate of 43.24 %, almost 27 percentage points higher than the average of FLAP.

Madrid vs Países FLAP en términos de capacidad de mercado (MW Built IT Power) 2021-2026F



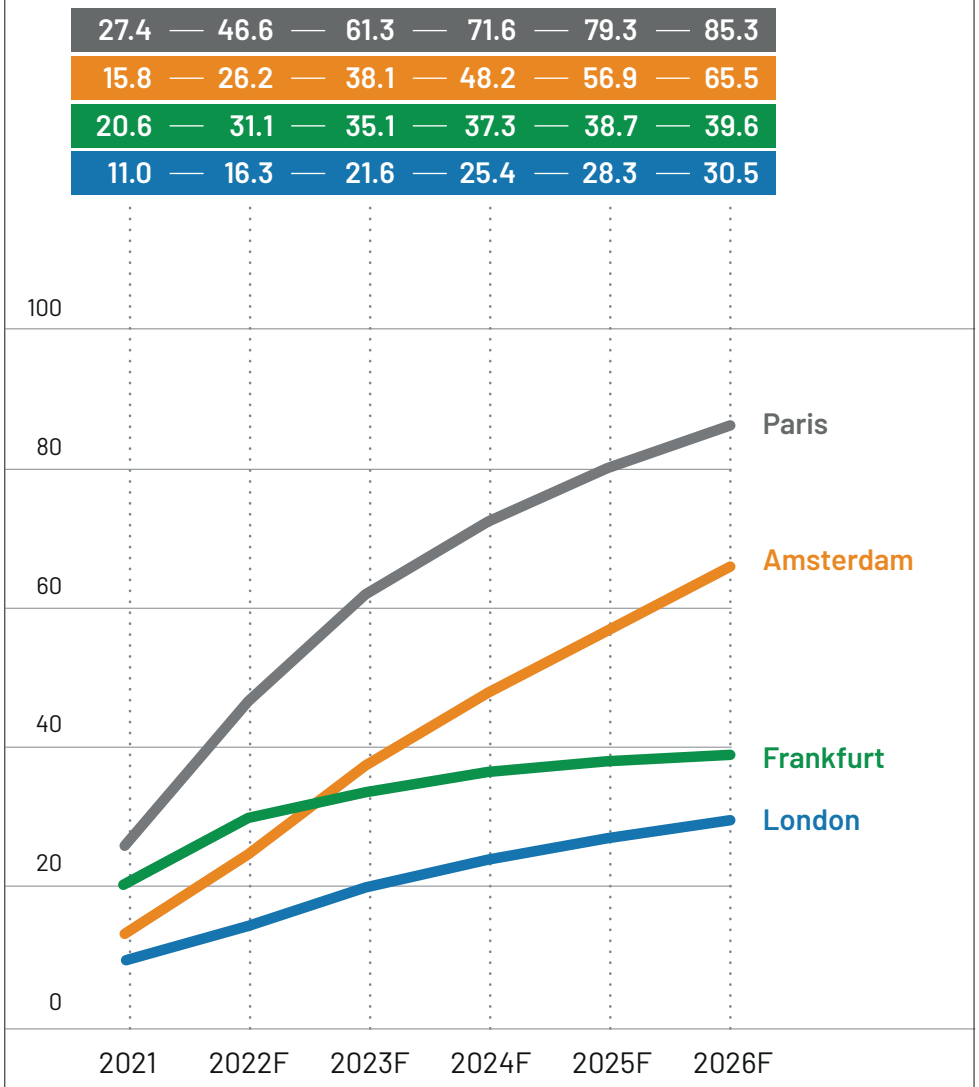
Source: prepared in-house based on the report: Data Centers European Research Report. Q2 2020 and Q3 2021. Knight Frank // Global Data Center Market Comparison. Global ranking 2022. Cushman & Wakefield (see annex 1).

Frankfurt
London
Amsterdam
Paris
Madrid

Based on the data available at the time this report was published, Madrid is expected to attain a market capacity of 621 MW in 2026, increasing its IT power more than fivefold in 5 years (chart in the previous page).

This progression consolidates Madrid's very competitive position in Europe, particularly compared to the current FLAP markets, since it would reach 65.5% of the market in Amsterdam and over 85% of the market in Paris, as shown on the charts on the left of this page and in the next page.

Evolution of the percentage represented by Madrid in relation to each of the FLAP markets 2021-2026F



NOTE: This projection does not include and cannot include any initiatives involving the future or potential construction of data centers in Madrid or in the rest of Spain. These will be included in the corresponding annual report when the construction works of these centers begin.

The methodology used in this section is detailed in annex 1.

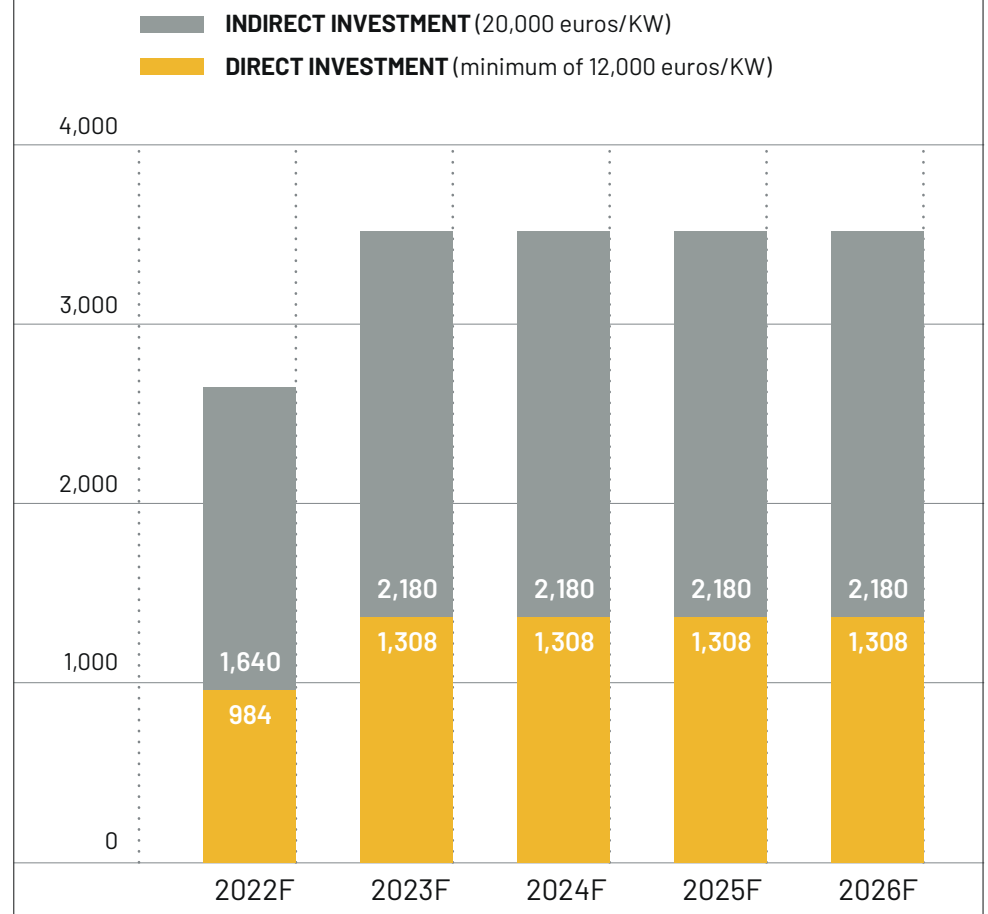
02

Investment in digital infrastructure

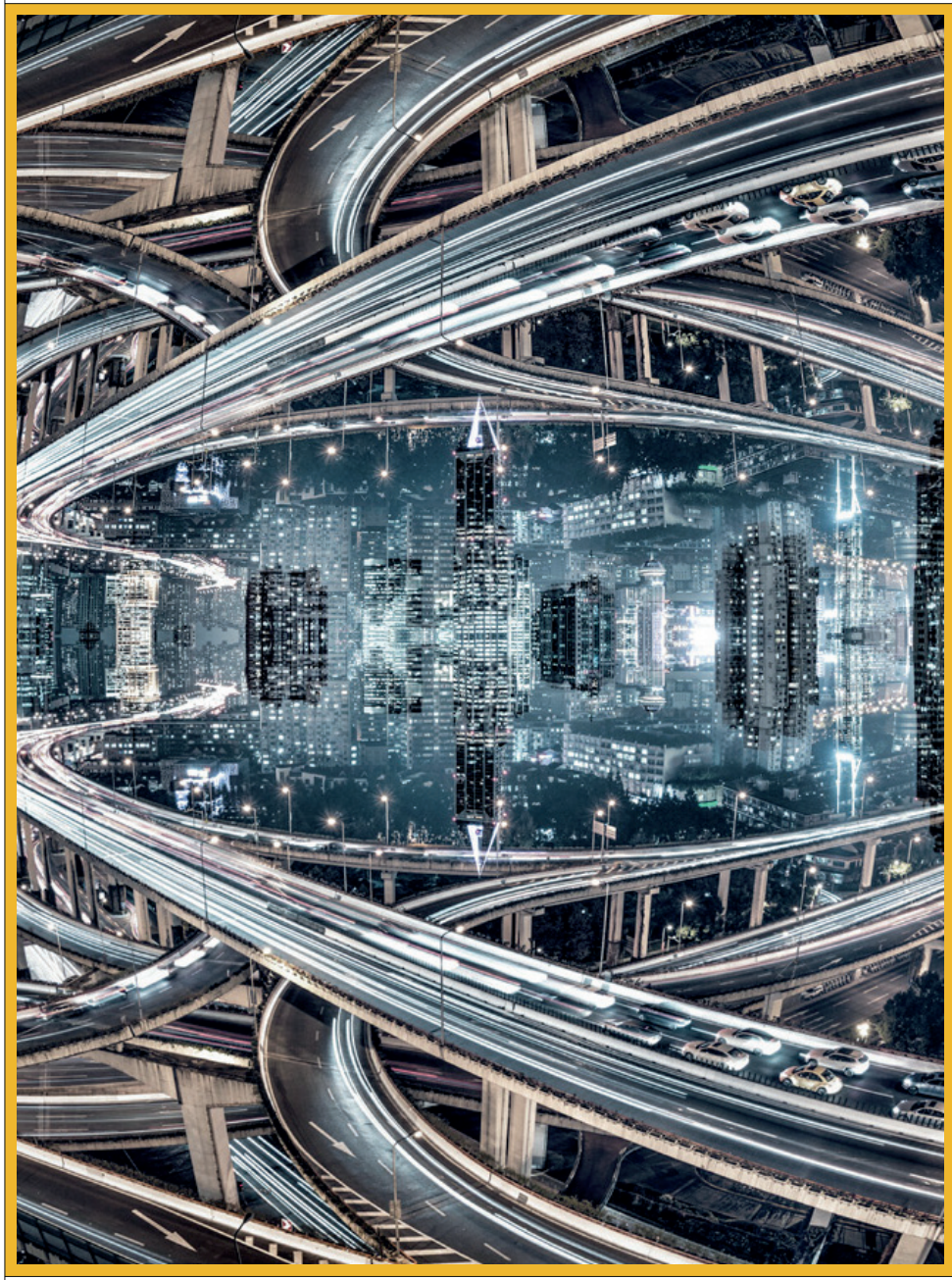
Following the same approach used above, this section focuses on Madrid, due to its role as the main hub of data centers in Spain.

In the scenario in which Madrid increases its capacity to reach 621 MW in 2026F, the accumulated direct investment up to that year can be estimated in over 6,000 million euros. An indirect investment of a minimum of 10,000 million euros must be added to that estimation.

Direct and indirect investment (in millions of euros) based on the expected market growth of MADRID 2021-2026F



Source: prepared in-house (annex 2)
The methodology used in this section is detailed in annex 2.



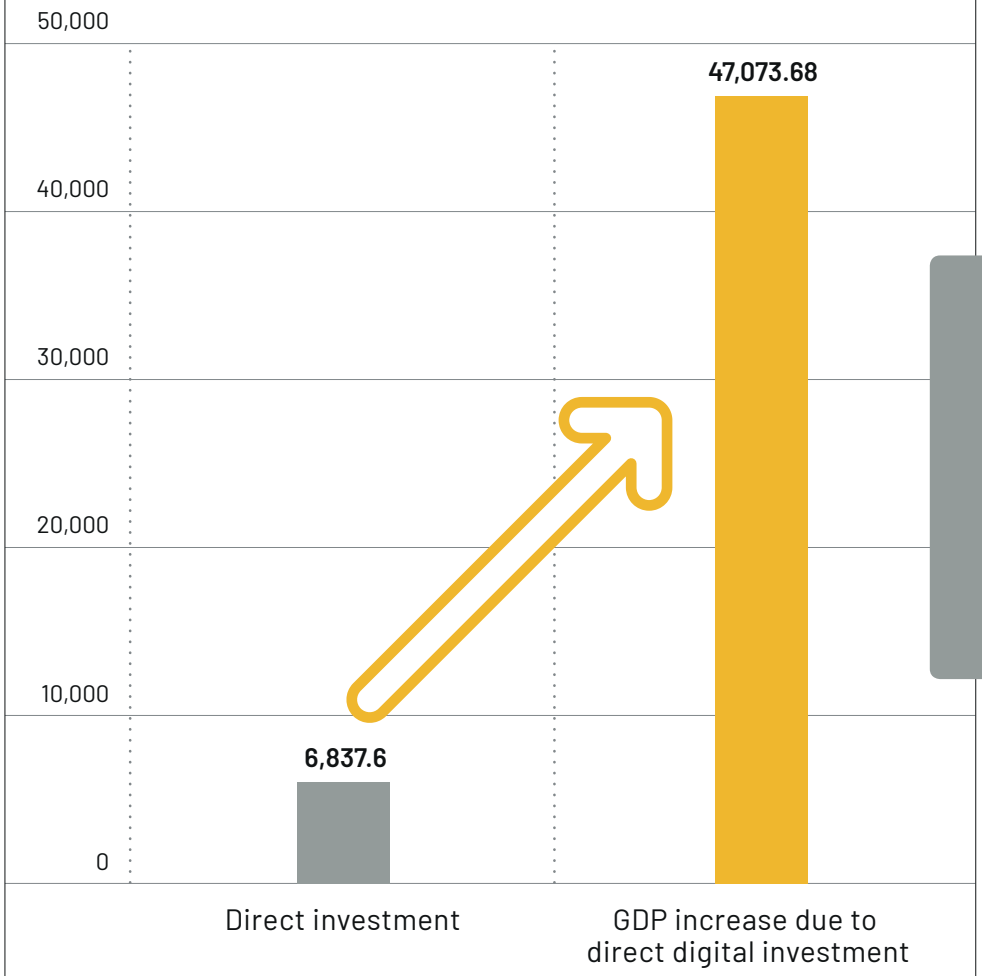
03

Stimulating the economy of Madrid and Spain

Finally, this section analyzes the impact that investments in digital infrastructure have on the national GDP using an econometric model.

All digital services combine IT platforms featuring the applications executed to support the services, devices capturing the results of the processes, and communication networks interconnecting devices and platforms. Data centers are the infrastructures housing the IT platforms and therefore the necessary supporting structure of the hardware and software of the digital economy. They are the engine powering the digital transformation. Based on this premise, we understand that the growth of the data center industry can be a proxy for the growth in digitization.

Estimated contribution to Spain's GDP made by the investment in data centers (digitization) based on the DESI digitization index, and the evolution of the contribution to Spain's GDP made by the digital economy



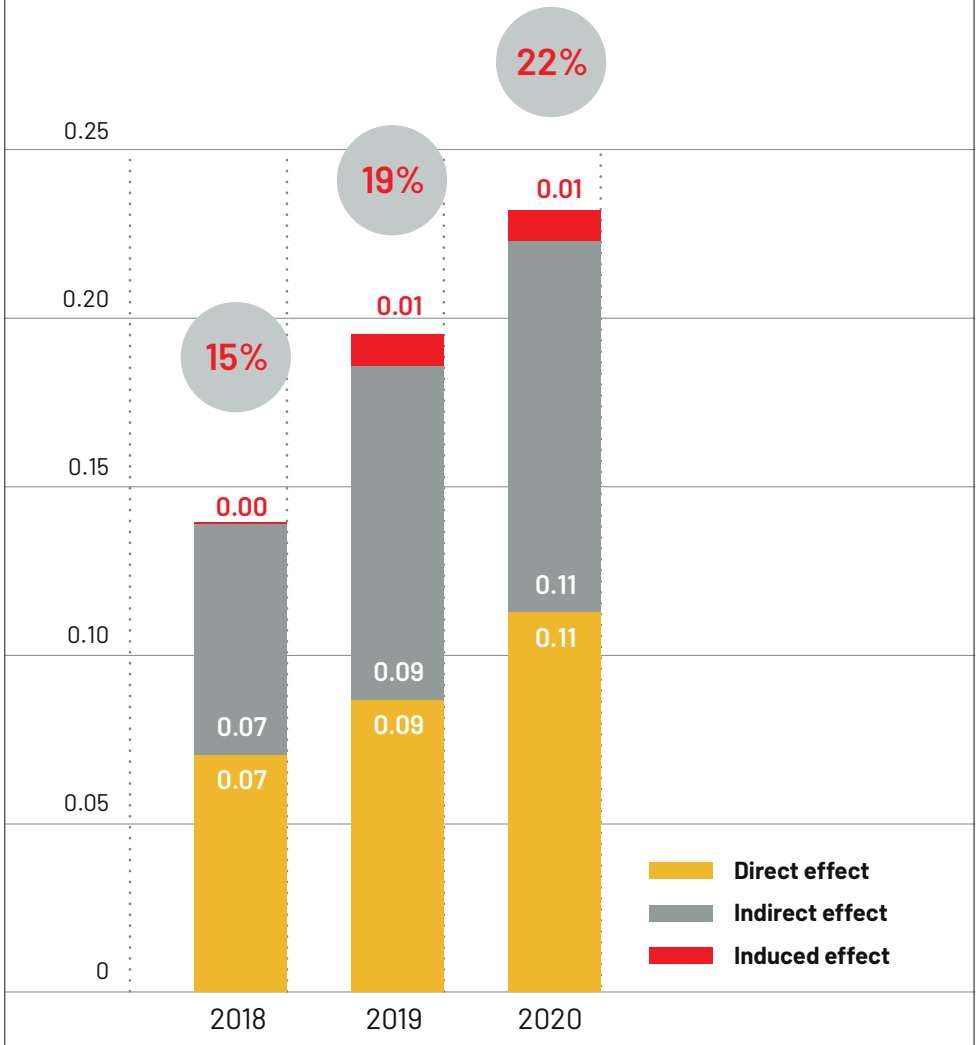
Source: prepared in-house (annex 3)

The impact on the GDP is of 7 euros for every euro invested in the industry of data centers

Taking into consideration the evolution of the DESI (Digital Economy and Society Index), investments in digitization, which mainly concentrate on the development of data centers, can add 47,073.68 million euros to the National GDP until 2026. This represents an increase of 3.9% of the GDP, which could reach 1,250,067 million euros by then. If the investment in data centers in Spain is estimated in 6,837.6 million euros (calculated based on the estimations of the Madrid hub; annex 3), the multiplier effect is of 7 euros for each euro invested in the industry of data centers.

The contribution of the digital economy to the Spanish GDP shows a growing trend. In 2018, it accounted for barely over 15% of the GDP whilst in 2020, it increased its share of the GDP to 22%. The chart also shows the evolution of the direct contribution derived from activities related to the construction of data centers, the indirect contribution or the one derived from investments made in the infrastructure supply chain, and the induced contribution derived from the housing, transportation and salaries of the employees involved in the aforementioned activities.

The GDP of the Community of Madrid represents 19.30% of the national GDP, so the increase could total 9,085.21 million euros.



Source: Prepared in-house based on the report "Economía Digital en España" [Digital Economy in Spain], produced by the Spanish Association of Digital Economy [Adigital] and the data of the Spanish National Observatory for Telecommunications and the Information Society (ONTSI) (2019).

The methodology used in this section is detailed in annex 3.

The information used to prepare the following table was sourced from reports published by Knight Frank for the second quarter of 2020 and the third quarter of 2021 for EMEA and each of its markets, as well as from the Cushman & Wakefield 2022 report.

The forecast was carried out attributing the data on capacity (Build IT power) "under construction" to the short term and the data on "phased" capacity to the medium term and lineally for the years 2023-2026.

		2021	2022F	2023F	2024F	2025F	2026F
London	% Grow		0.20	0.20	0.17	0.14	0.13
	MW	940	1,132	1,358	1,584	1,810	2,037
Frankfurt	% Grow		0.19	0.42	0.30	0.23	0.19
	MW	499	594	844	1.094	1.344	1.594
Paris	% Grow		0.06	0.21	0.17	0.15	0.13
	MW	376	397	480	563	645	728
Amsterdam	% Grow		0.09	0.09	0.08	0.08	0.05
	MW	650	707	771	836	900	948
TOTAL FLAP	% Grow		0.15	0,22	0,18	0,15	0,13
	MW	2,465	2,830	3,453	4,076	4,699	5,307
Madrid	% Grow		0.80	0. 59	0,37	0,27	0,21
	MW	103	185	294	403	512	621

The rest of the charts and tables in this section have been prepared in-house based on this information.

The charts shown in section 2 were sourced from the following table produced using the estimations of the previous section and the information provided by SPAINDC. It details that the direct investment (including the investment on land+power+construction) has an approximated cost between 12,000 and 16,000 euros/KW). There is also a direct investment that includes the value of the assets housed in the Data Centers. These include the Hardware or HW (computers, network, security or storage equipment); the software or SW (licenses and investment in developing the systems installed on the HW); and operating and maintaining all this equipment: outsourcing companies, integrators, installers, cybersecurity, etc., which can be estimated to cost 20,000 euros/KW (SPAINDC).

	2021	2022F	2023F	2024F	2025F	2026F	IN 5 YEARS (22-26)
ANNUAL MW INCREASE		82	109	109	109	109	
MW	103	185	294	403	512	621	
DIRECT INVESTMENT[1] (minimum of 12,000 euros/KW)		984	1,308	1,308	1,308	1,308	6,216
INDIRECT INVESTMENT1[1] (20,000 euros/KW)		1,640	2,180	2,180	2,180	2,180	10,360

1: in millions of euros.

The rest of the charts and tables in this section have been prepared in-house based on this information.

	2021	2022F	2023F	2024F	2025F	2026F	IN 5 YEARS (22-26)
GDP (INE)[1]	1,202,994.00	1,202,994.00	1,202,994.00	1,202,994.00	1,202,994.00	1,202,994.00	
DESI INDEX	57.50					80.00	39.13
GDP INCREASE1[1] (according to models)							47,073.68

1: In millions of euros. INE: Spanish National Statistics Institute.

In order to analyze the impact on the GDP made by investments in the industry of data centers, econometric models that analyze the relationship between digitization and wealth creation have been taken into consideration[4]. These models show there is a direct relationship between digitization and GDP growth, so it is estimated that an increase of 10% in the DESI[5] (Digital Economy and Society Index) digitization index produces a one percentage point increase of the GDP.

4: There are different approaches for analyzing the contribution of the data center industry to wealth creation. One of the approaches proposed by Deloitte in its report "El impacto de la digitalización en España", based on Bruegel et al. (2019), draws a relationship between the digitization of the country, reflected in the Digital Economy and Society Index (DESI) produced by the European Commission, and the economic growth represented by the Gross Domestic Product. The report of the European Commission "Digital Economy and Society Index for 2021" shows a growing trend of the DESI for Spain, which is higher than the average of the EU.

5: The Digital Economy and Society Index or DESI is an indicator that each year measures the performance and evolution of the EU Member States in the area of digital competitiveness. It takes into consideration five parameters: Digital public services, Connectivity, Use of internet services, Human capital, Integration of the digital economy.

Based on the following information and hypothesis:

1 /// GDP (in millions of euros) 2021: 1,202,994 (source INE). Adopting a conservative position, it is expected to remain constant

2 /// DESI (European Commission). Taking into consideration the prospects of the digitization plans in Spain and the trend of the index, this index is expected to increase by 39%.

We expect Spain's GDP to grow by 47,073.68 million euros.

The increase of the national GDP has been compared with the investment in data centers in Spain in order to calculate the multiplier effect. Since the investment in data centers in Madrid is of 6,216 million euros, and the Madrid hub is estimated to represent 91% of the Spanish market, we estimate that the investment in data centers in Spain will be of 6,837.60 million euros.

The growth of the GDP of Madrid was calculated taking into consideration that the GDP of Madrid accounted for 19.30 % of the national GDP in 2021.

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