2025 Data Center Report

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Research Center
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RSQUARE

In July 2025, the South Korean government announced plans to designate and support AI Data Center as next-generation national social infrastructure (SOC)

Key Policy Commitments for AI Infrastructure Development

1. Designate AI Data Centers as next-generation national SOC and support the development of facilities equipped with state-of-the-art GPUs
2. Establish a ₩100 trillion AI investment fund, leveraging government budgets and public funds as initial capital
3. Support the development of next-generation AI semiconductors to foster them as a core segment within the AI value chain
4. Build a global cooperation framework for infrastructure investment and data sharing

Source National Policy Planning Committee

Stargate Project Announcement

A U.S. AI infrastructure initiative unveiled in January 2025, committing up to USD 500 billion by 2029, marking the largest data center development and infrastructure project in global history

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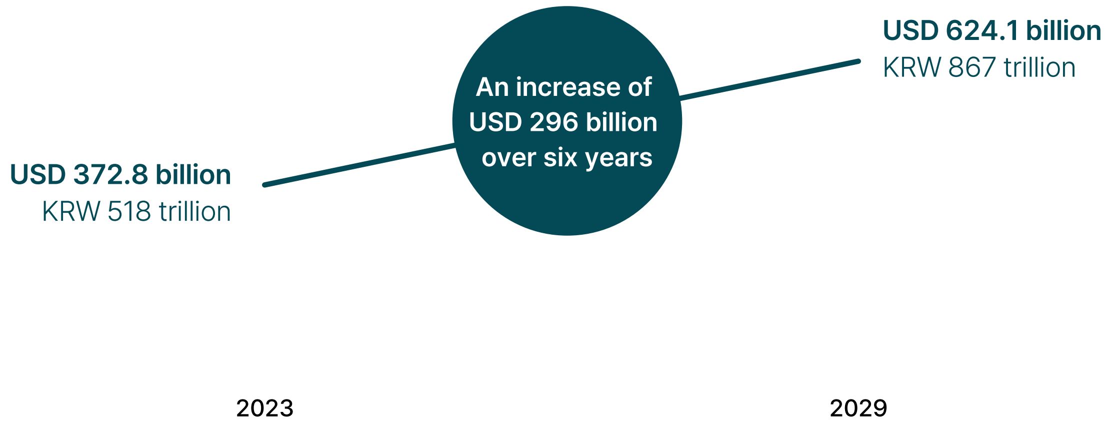
Global Data Center Market Share



Source
STATISTA

1 Data Center Composition

Data Center

A data center is a physical space, building, or facility that houses the IT infrastructure required to build, operate, and deliver applications and services[1]. It integrates systems such as networking, power, HVAC, and security, emerging as a key sector within the New Economy

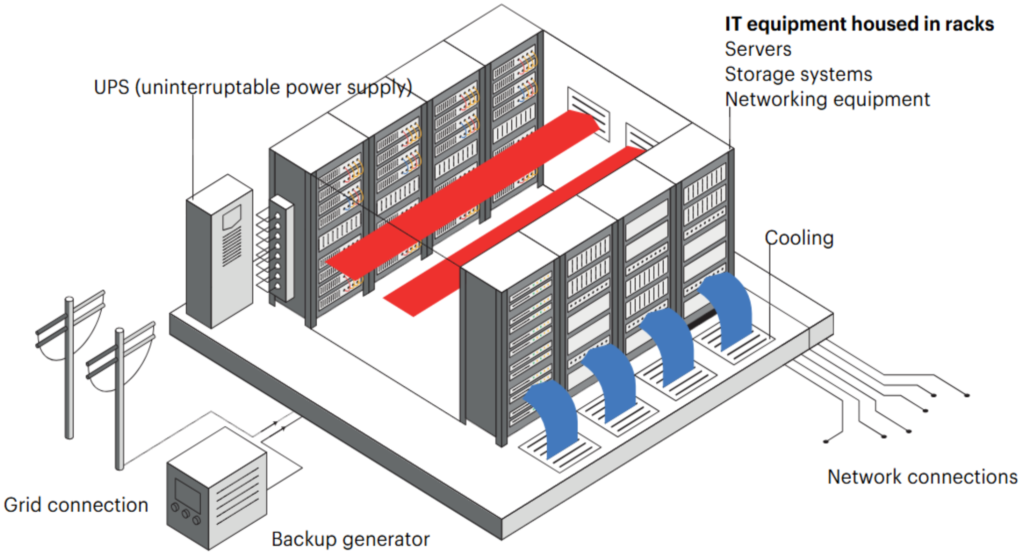
1) IBM

Under domestic building and urban planning regulations, data centers are classified as a subcategory of telecommunications facilities, applicable to sites with a computer room floor area of 500m² or more

During operation, they require high-voltage power supply and receive stable electricity through power supply agreements with Korea Electric Power Corporation(KEPCO)

Source KaKao

Data Center Key Facilities



Source IEA, Naver

ICT Facilities				Power Facilities		Cooling Facilities	
Rack	A structural framework designed to vertically stack servers, storage devices, and network equipment	Storage	Serves as a storage hub for the permanent preservation of data	Transformer	Adjusts external high-voltage electricity to lower voltage levels to ensure stable power supply to facilities	CRAC/ CRAH	Removes heat and controls humidity within the data center using refrigerants or chilled water
Server	Provides computing power to run various programs and services, performing data computation and processing the core of a data center	Network	Enables data exchange by connecting internal and external networks within the data center	**PDU** Power Distribution Unit	Distributes electricity to data center equipment such as servers and networks	Chiller	Produces chilled water to supply CRAH units
				UPS Uninterruptible Power Supply	Provides backup power during outages or power disruptions to maintain stable operations	Cooling Tower	Absorbs heat generated inside the data center and releases it into the atmosphere

Data Center Power Flow

Electricity flows into the data center from external substations and is distributed to IT equipment such as servers and network systems

1) Utility Feed

Electricity supplied to data centers is primarily sourced from local power grids. To ensure redundancy, multiple power feeds are typically secured from separate grid connections

2) Switchgear

The main switchgear serves as the initial point where external power enters the data center, distributing the incoming electricity into several smaller circuits

3) Transformer

After passing through the main switchgear, power is routed through transformers that adjust voltage levels suitable for data center infrastructure

4) Uninterruptible Power Supply

The UPS stores power and provides emergency power during outages, maintaining electricity for several minutes until generators start operating.
It also mitigates power quality issues such as voltage drops or surges, preventing damage to critical equipment

5) Power Distribution Units(PDU)

Power supplied from the UPS is delivered to the Power Distribution Unit (PDU), which converts electricity to appropriate voltage levels for data center equipment and distributes it to individual server racks, switches, and other devices

6) Remote Power Panels(RPP)

Power then flows to the Remote Power Panel, a compact distribution unit equipped with fuses, circuit breakers, and grounding protection. The RPP divides the power received from the PDU into individual circuits, supplying it to server racks, switches, and other components

7) Power Whips

Flexible power cabling connects PDUs or RPPs to server racks and IT equipment. Depending on the data center design, these cables are installed either overhead (ceiling-mounted) or beneath raised floors

8) Server Racks

Each server rack contains its own rack-mounted Power Distribution Unit, supplying electricity to individual IT infrastructure components such as servers, storage devices, and network equipment

Source Dgtl Infra

Data Center Key Terminology

1. Power & Power Consumption

Power

The amount of electrical power an electrical device consumes or generates at a given moment

Unit kW, MW

Power Consumption

The total amount of electricity used over a specific period

Unit kWh, MWh

Formula Power (kW) × Operating Time (h)

Electricity costs are calculated based on kWh usage

e.g.) If a data center continuously uses 1,000 kW for 24 hours → 1,000 kW × 24 h = 24,000 kWh

2. Power Receiving Capacity

Indicates the maximum level of electricity a data center can stably receive from the external power grid

1. Data centers typically operate at 60–70% of their total receiving capacity as constant load
2. Additional capacity is usually reserved to accommodate sudden traffic surges or new tenants

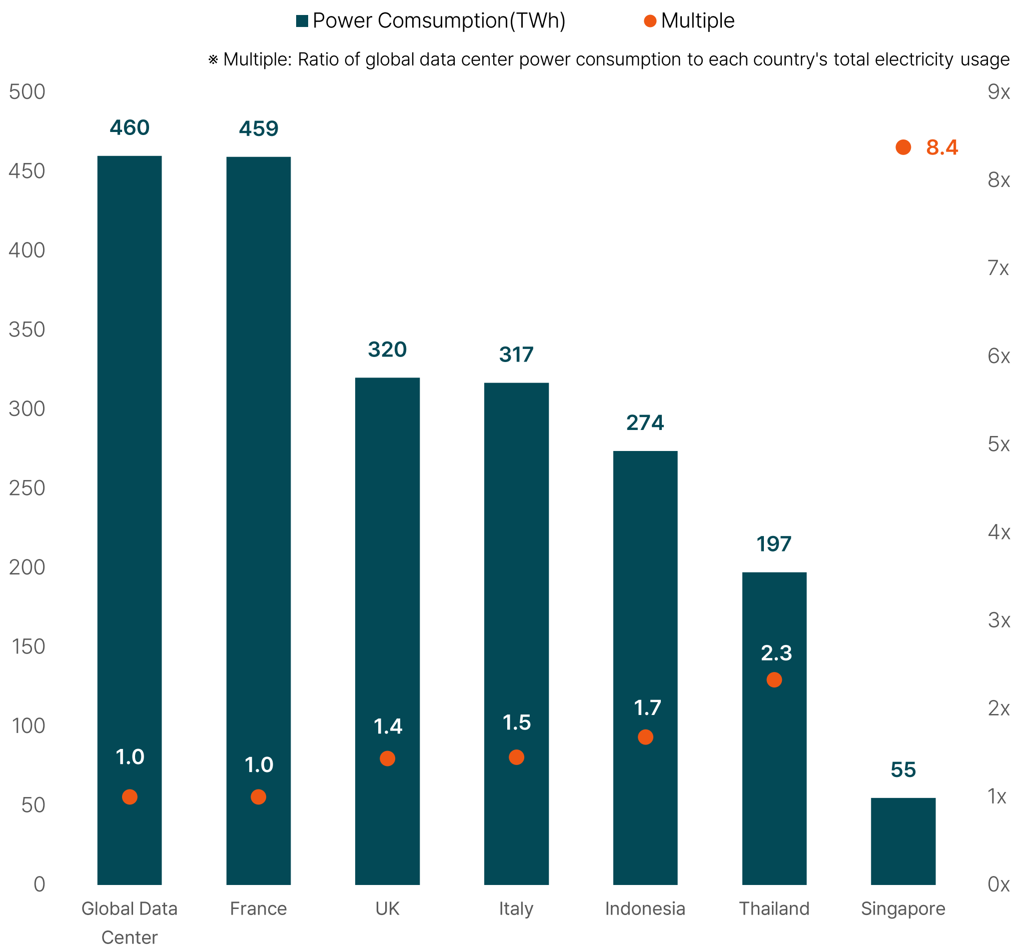
3. IT Load Capacity

Represents the electricity directly consumed by IT equipment such as servers, storage, and network systems

1. The portion of total data center power used by IT equipment
2. Serves as the key reference value in power-based data center rents

1-1

Comparison of Global Data Center and National Power Consumption (TWh), 2022



Source EMA, OECD, PLN, Terna, DUKES/IEA Bioenergy, RTE, IEA

Data Center Key Terminology

4. PUE (Power Usage Effectiveness)

A standard efficiency metric that measures how effectively a data center uses energy

Unit kW, MW

Significance A PUE value closer to 1 indicates more efficient power utilization within the data center

$$\text{PUE} = \frac{\textit{Total Facility Energy Consumption}}{\textit{IT Equipment Energy Consumption}}$$

Total Facility Energy Consumption

The total amount of electricity used across all systems in a data center, including cooling, security, servers, and storage

IT Equipment Energy Consumption

The electricity consumed by IT equipment that directly delivers data services, such as servers, storage, and network devices

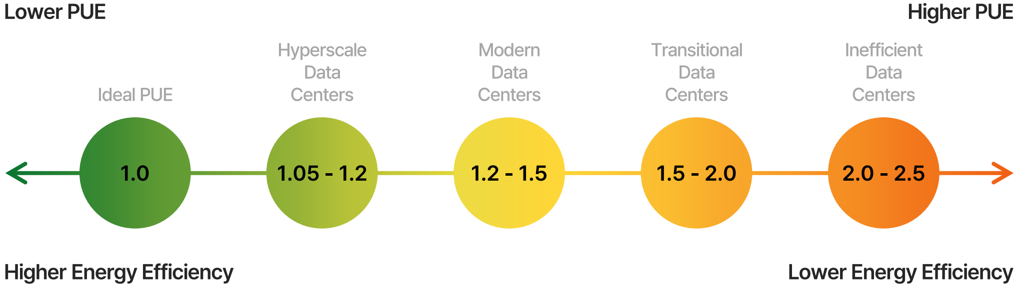
Example)

A PUE of 1.5 means that the data center uses 1.5 times the total energy required to power its IT equipment

Reference)

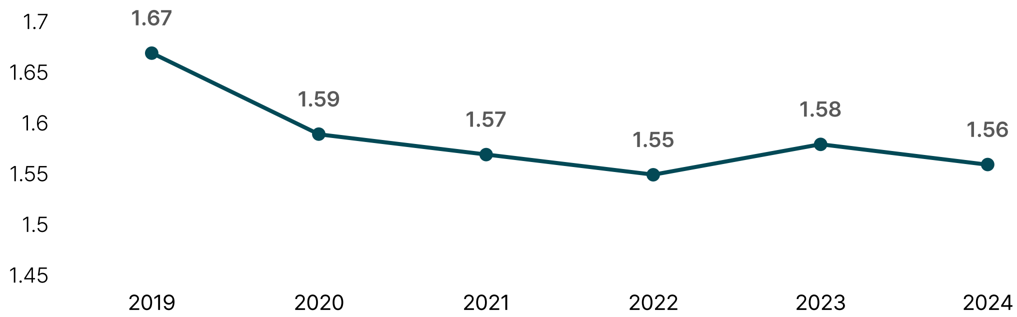
1. As of 2024, the global average PUE for data centers is 1.56
2. Meta operates with an average PUE of 1.09, marking the highest efficiency among global big tech companies

4-1. PUE Efficiency Levels by Value



Source Dgtl Infra

4-2. Global Trends in Average PUE



Source Uptime Institute

Data Center Key Terminology

5. IT Space

Refers to the leasable area within a data center where core IT equipment such as servers, storage, and network systems are installed

Also known as 'White Space', denoting the clean, brightly lit environment dedicated to IT equipment.
In contrast, areas housing supporting infrastructure such as power, cooling, and transformers are referred to as 'Grey Space'

Configuration

Within the white space, racks, cabinets, and cages are installed, and the area can be subdivided into secure or client-exclusive zones as needed

Significance

White space area is one of the key metrics used to define the scale of a data center. In Korea, many operator-owned data centers determine rents based on white space area

6. Colocation Space Units

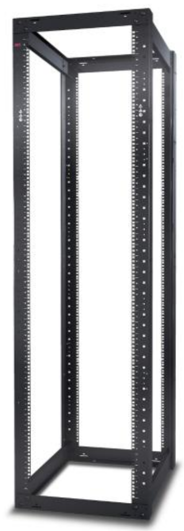
Term	Description	Scale	Security Level
Rack	• A structural frame used to mount and secure servers, storage, and network equipment in a vertical configuration	Small	Low
Cabinet / Enclosed Rack	• An enclosed, lockable unit with doors and panels that houses equipment such as servers, switches, and PDUs	Small	Low
Cage	• A dedicated area within the data hall partitioned by wire mesh, fencing, or hard walls, accommodating multiple cabinets with restricted access control	Medium	Medium
Private Room / Suite	• A fully enclosed private room within the data center, designed with dedicated cooling, power, and security systems	Large	High

Source Digital Realty, SERVPAC, Sunbird DCIM, STL Partners

Data Center
Key Terminology

6-1.
Rack, Cabinet, Cage

Rack



Cabinet /
Enclosed Rack

Source Schneider Electric, Equinix

2 Data Center Types

Data Center Classification

1. Classification by Tier

- Data centers are classified into tiers based on availability, as defined by U.S. certification institutions
  Availability refers to the facility's ability to operate stably 24/7, 365 days a year, even under emergency conditions
- Higher tiers indicate greater performance and availability but also entail higher capital and operating costs
- In Korea, most data centers are built to Tier III standards, as construction costs for Tier IV facilities are more than double those of Tier III, making Tier III a more cost-efficient choice

Source UTI, KDCC

Category	Tier I	Tier II	Tier III	Tier IV
Power and Cooling Supply Pathways	Singular	Singular	Multiple	Multiple
Backup Equipment	N	N+1	N+1	2(N+1)
Operational Characteristics	Maintenance cannot be performed during operation	Maintenance cannot be performed during operation	Maintenance can be performed concurrently with operation	Maintenance can be performed concurrently with operation
Operation During Failure	Impossible	Possible	Possible	Possible
Annual Availability	99.67%	99.74%	99.98%	99.995%
Annual Downtime	29 hours	22 hours	1.6 hours	26 minutes
End Users	General Internet Services	Small and Medium Colocation	Colocation and IT Service Providers	Financial Institutions and Government Agencies

2. Classification by Scale

- Data centers are categorized by scale based on rack count, white space area, and power receiving capacity
- Recent trends show that local governments and operators are driving the development of hyperscale facilities with power capacities exceeding 80MW
- In contrast, in Seoul where securing large-scale power supply is challenging the market is primarily composed of small to mid-sized data centers with relatively limited white space

Source KPMG, KDCC, DCI

Scale	No. of Rack(Units)	White Space Area	Power Receiving Capacity	Remarks
Hyperscale	10,000 or more	37,161m² or more	80MW or more	Power receiving capacity is often described using both Mega and Hyperscale classifications interchangeably
Mega	9,001~9,999	22,501~37,160m²	40~80MW	
Massive	3,001~9,000	7,501~22,500m²	20~40MW	
Large	801~3,000	2,001~7,500m²	10~20MW	
Medium	201~800	501~2,000m²	Less than 10MW	
Small	11~200	26~500m²		
Mini	1~10	1~25m²		

Data Center Classification

3.
Classification by Operation Type

On-Premise Data Center

A data center that is owned and operated directly by an enterprise, hosting private IT infrastructure on-site. It enables organizations to manage critical data and personal information internally, enhancing both security and regulatory compliance

Source EQUINIX

Co-Location Data Center

A service provider leases power, space, and management services within the facility to clients, where as the name suggests multiple tenants share the same data center

3-1.
Colocation Operation Models

Data center leasing and operation structures are categorized into self-operation, master lease, and consignment operation, each differing in operator responsibility, revenue structure, and risk allocation

* *Triple Net(NNN)*: A lease structure in which the tenant bears all property-related expenses, including taxes, insurance, and maintenance costs

Category	Self-Operation	Master Lease	Consignment Operation
Definition	The landlord directly manages operations, including marketing	The tenant leases the entire facility and either subleases or operates it directly	The landlord retains ownership but outsources operations to a professional operator
Lease Structure	Direct contracts with clients	Landlord: secures fixed rent Tenant: earns operational profit or sublease spread	Landlord: receives sales-based fees Operator: receives base fees + performance fees
Operation & Maintenance Costs	Borne by landlord	Borne by tenant under NNN structure	Borne by landlord
Advantage	Potential for upside in revenue	Stable NOI Minimized vacancy risk	Professional operational expertise secured
Disadvantage	High vacancy and operational risks; workforce management challenges	Limited rental upside during lease term	Profitability dependent on operator capability

3-2.
Colocation Lease Types

- Colocation leases are broadly classified into retail and wholesale types, differing in scale, management responsibility, and Lease Term

* *Fit-out*: Construction work that prepares the interior for operational use according to the tenant's requirements
e.g. DC Shell, Power systems, HVAC, etc.

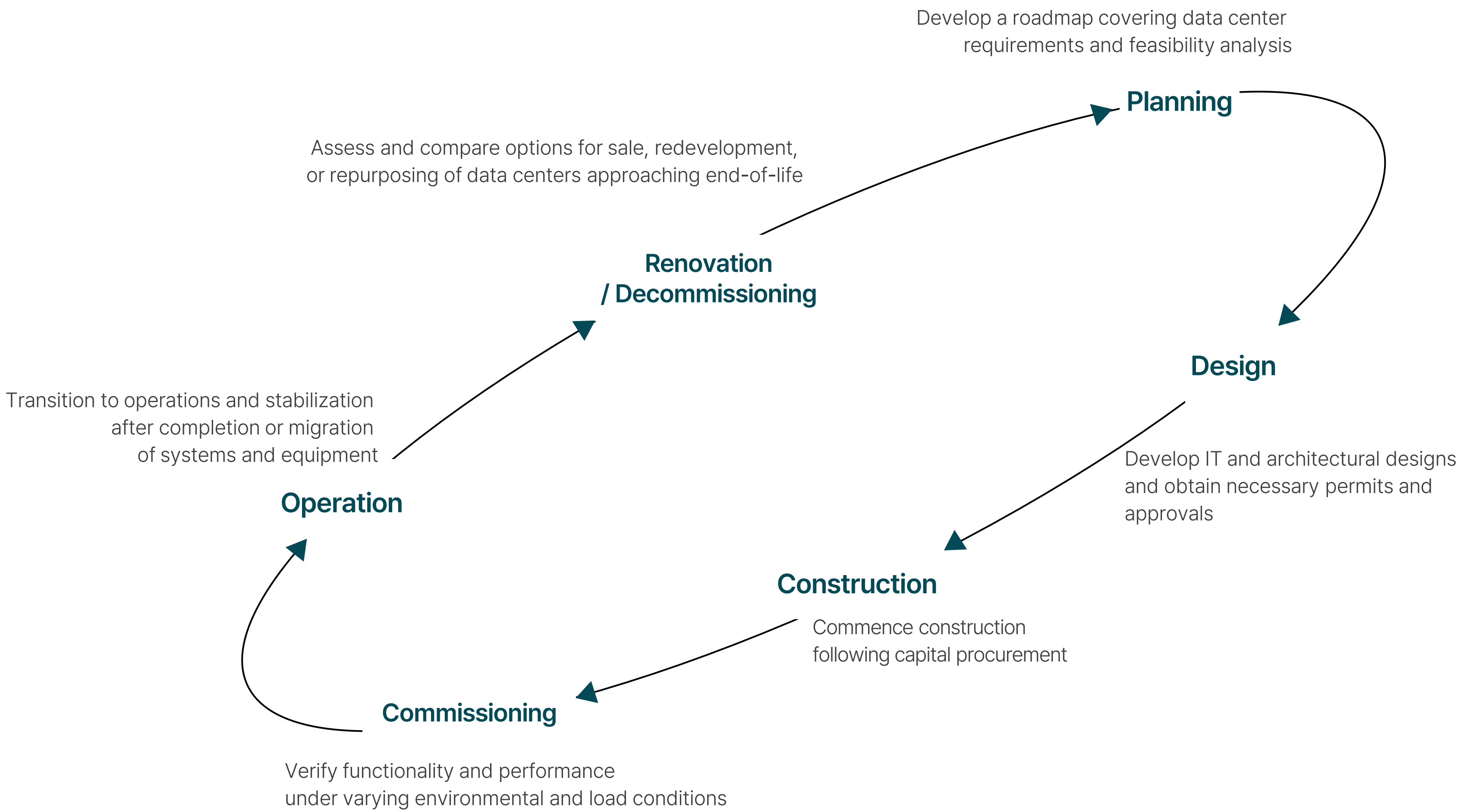
Category	Retail Colocation	Wholesale Colocation
Scale	1/4 to Dozens of Racks	Dozens to Thousands of Racks
Lease Structure	Rack Unit	Power Capacity Unit, IT Space Unit
Power Pricing(kW)	Relatively High	Relatively Low
Main Client	SME, Startup	CSP, Enterprise
Lease Term	1~3 years	5~20 years
Operation & Maintenance Costs	Borne by Landlord	Borne by Tenant
Scalability	Limited Scalability	Capable of Large-Scale Expansion
Structural Drawbacks	1) Short-Term Leases 2) Tenant Attrition Risk	Initial Fit-Out Required

3 Data Center Supply

Data Center Supply

1. Data Center Development and Operation Lifecycle

- Data centers are complex infrastructure assets with long-term development and operation cycles, typically progressing through six stages: Planning → Design → Construction → Commissioning → Operation → Renovation/Decommissioning. Each stage requires integrated consideration of financial feasibility, technical performance, and operational stability
- From project planning to completion, development generally takes around 3.5 years, with key variables including site acquisition, permitting procedures, and power supply agreements with KEPCO. As operations extend over several decades, data centers are regarded as assets that must balance initial development risks with long-term operational efficiency
- The economic lifespan of a data center is typically 15 to 20 years. After this period, facilities may undergo renovation to accommodate high-density racks, or, in cases of declining profitability or technological relevance, face decommissioning or repurposing



Source KDCC, RSQUARE

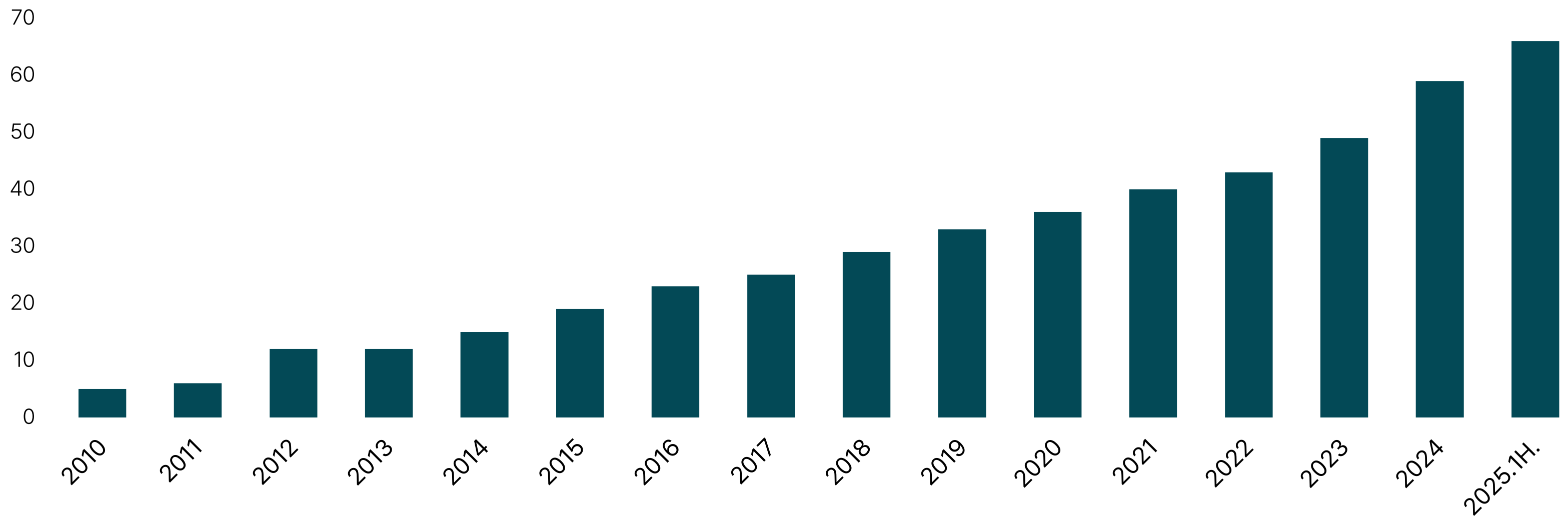
Data Center Supply

2.
Cumulative Supply of Private Data Centers in Korea (2010–2025.1H)

- Since the widespread adoption of smartphones in 2010, private data center supply in Korea has shown steady growth, recording an average annual increase of 20.3%
- Driven by advancements in ICT technologies such as 5G and AI during the pandemic period, market participation by asset managers and operators has expanded, accelerating supply growth over the past five years
- Recently, some existing office buildings in major business districts of Seoul and dense office clusters such as Gasan Digital Complex have been repurposed for data center use

Source Ministry of Land, Infrastructure and Transport, RSQUARE
※ New Construction, Expansion, and Change of Use

Unit Building



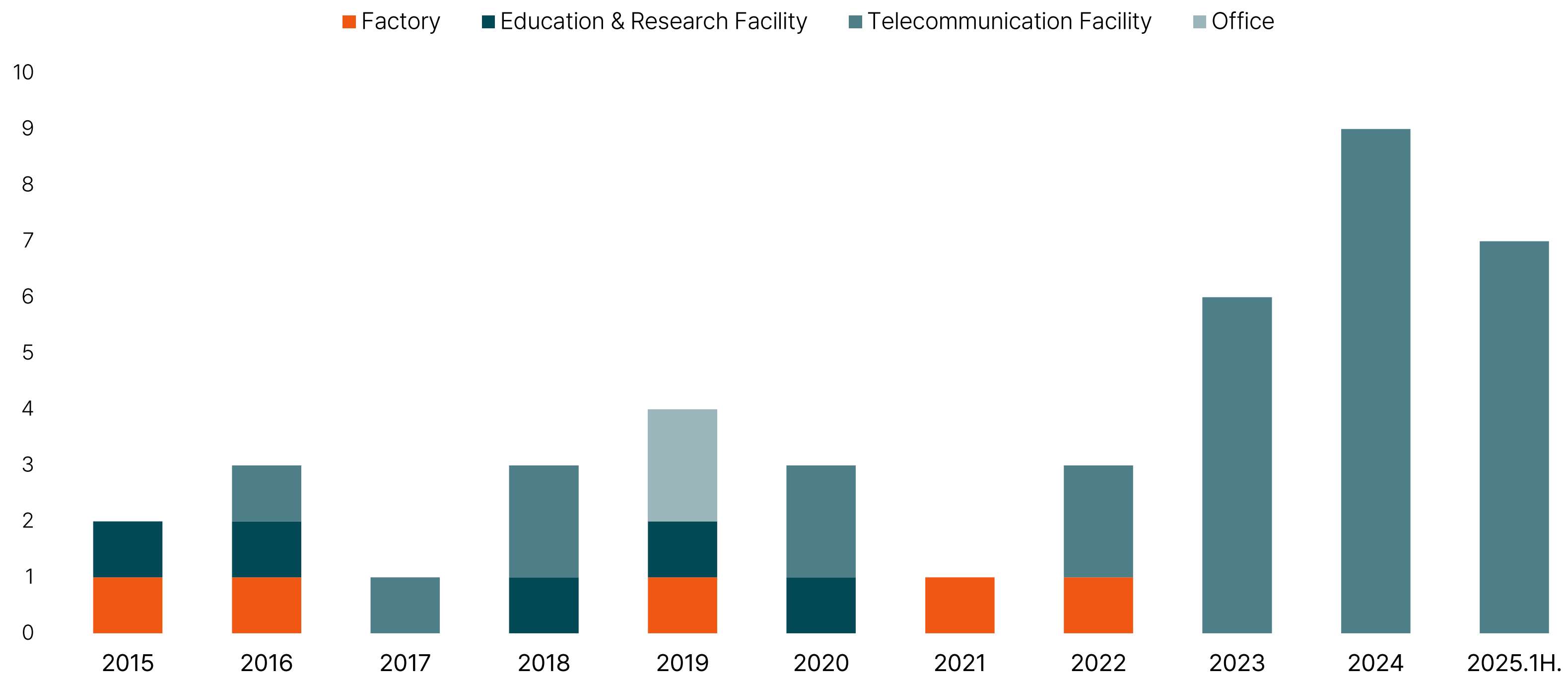
Data Center Supply

3.
Building Use of Data Centers

- Following the amendment to the Enforcement Decree of the Building Act on Sept 4, 2018, data centers were newly designated as a subcategory under telecommunications facilities. The amendment took effect on Mar 5, 2019, six months after promulgation
- Before this enforcement, data centers operated under various building classifications such as educational and research facilities, office buildings, or factories, and in most cases continued operation without officially converting their use to data centers
- However, since data centers require specific operational standards such as fire safety and load capacity, inconsistencies in building classifications (e.g., office vs. factory) made unified regulation difficult, increasing the potential for greater damage when issues occur, as evidenced by the government data center fire in Korea on Sept 26, 2025

Building Use Classification of Private Data Centers by Completion Year

Source Ministry of Land, Infrastructure and Transport, RSQUARE
※ New Construction, Expansion

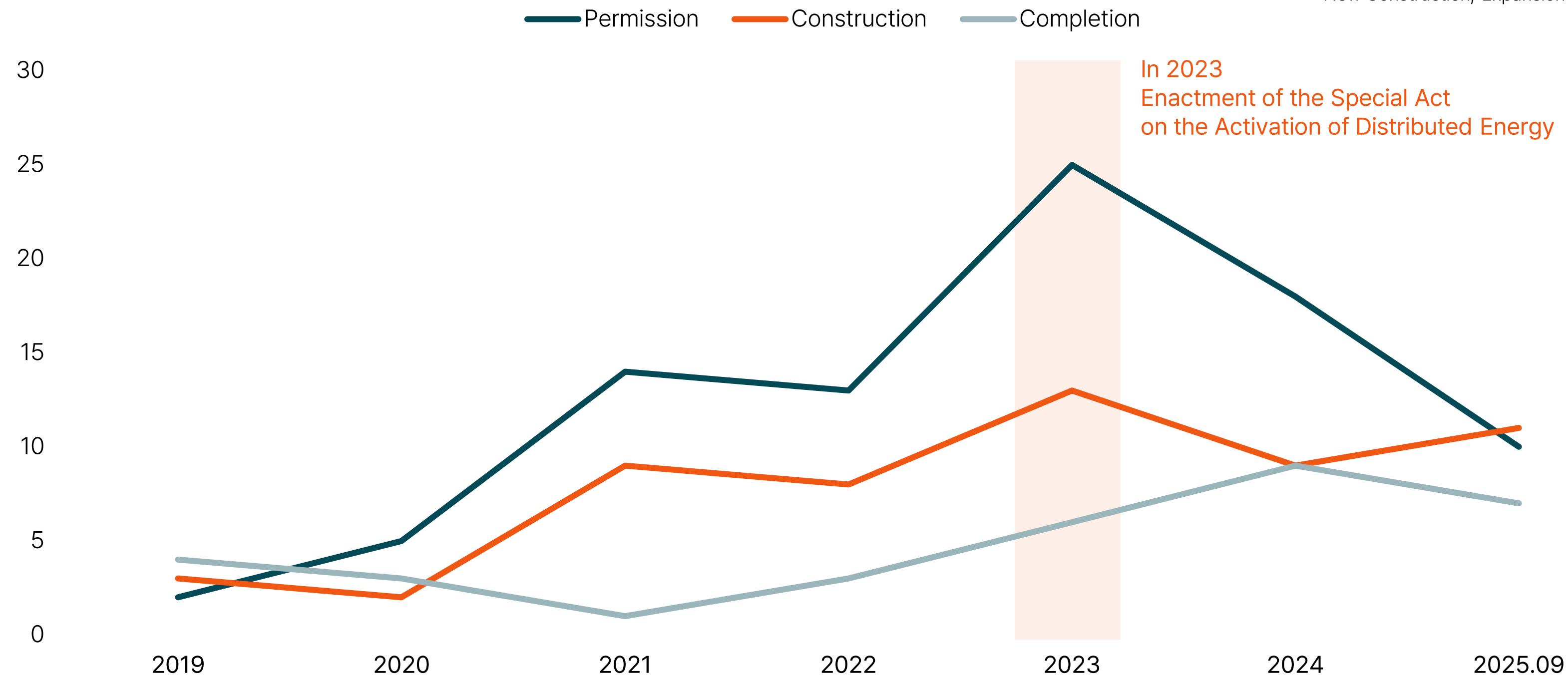


Data Center Supply

4.
Trends in Data Center Permission, Construction, and Completion

- The number of data center permits slightly declined in 2022 after steady growth since 2019 but rebounded in 2023. However, since 2023, the introduction of stricter feasibility reviews utilizing Power Supply Notification Forms and the enactment of the Special Act on the Activation of Distributed Energy have led to a sharp decline, with only 10 permits issued as of September 2025, roughly half the total recorded in 2024
- Most projects commence construction within the same year or the year following permit approval, resulting in closely aligned trends between permitting and construction activity. As of September 2025, sites previously approved are now breaking ground, leading to a renewed uptick in construction volume
- Completions generally take over two years from groundbreaking, creating an average two-year time lag. The number of completions is expected to rise through the end of this year but slightly decline in 2026

Source Ministry of Land, Infrastructure and Transport, RSQUARE
※ New Construction, Expansion



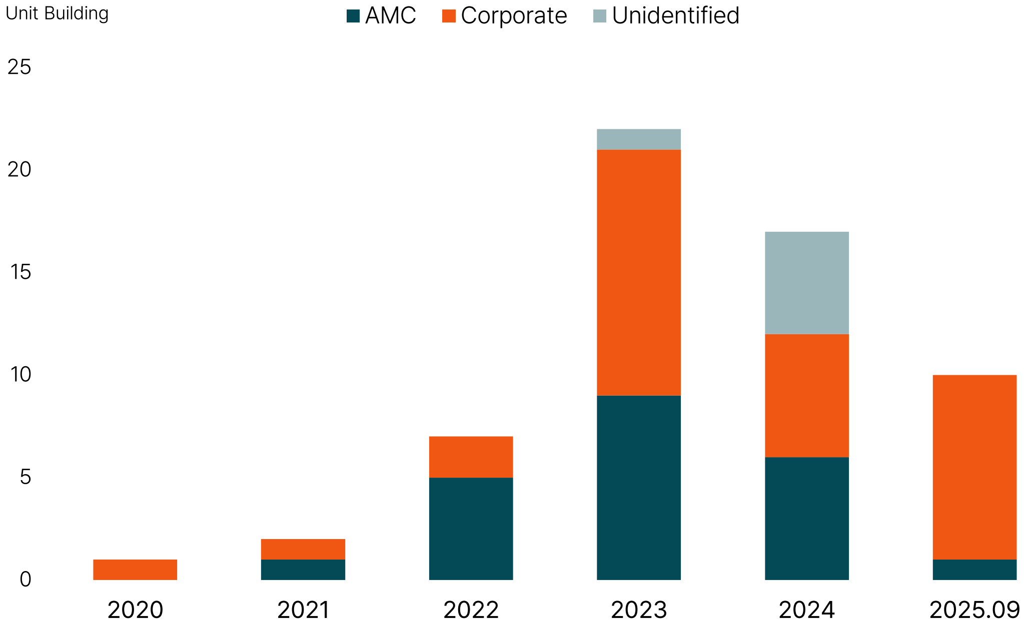
Data Center Supply

5. Supply Volume by Private Data Center Operator Category

Source Ministry of Land, Infrastructure and Transport, RSQUARE
※ New Construction, Expansion

6. Permitting Volume by Private Data Center Operator Category

Source Ministry of Land, Infrastructure and Transport, RSQUARE
※ New Construction, Expansion



- An analysis of data center completions between 2015 and 2021 shows that most projects were developed by key telecommunications operators or corporate entities for self-use purposes
- Since the pandemic, both domestic and international investor interest in Korea's data center market has grown, leading to an increase in asset managers' development activity from 2020 onward
- More recently, data center operators and cloud service providers such as Digital Edge and AWS have been actively developing facilities in collaboration with local governments

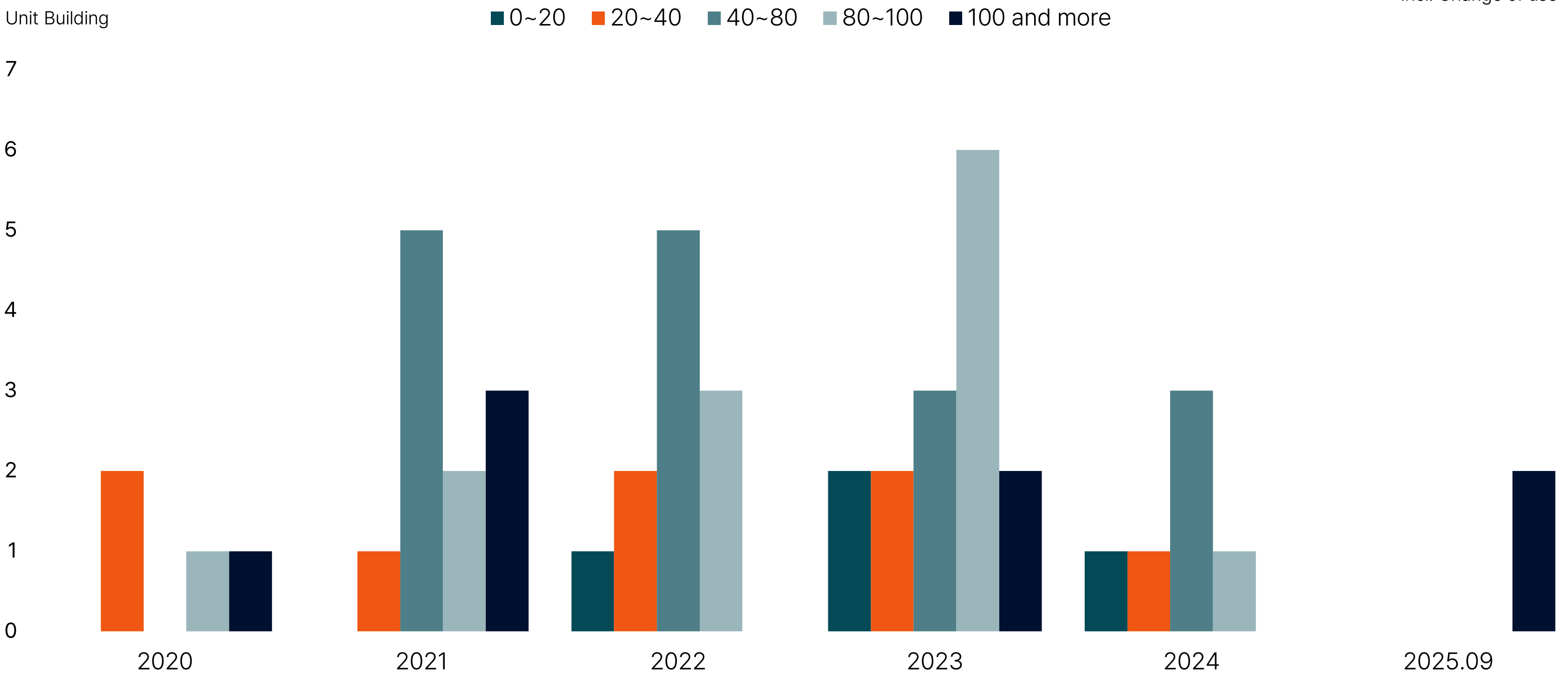
Data Center Supply

7.
Trends in Data Center Power Receiving Capacity

- Among recently approved projects, most data centers fall within the 40~80MW hyperscale range, followed by a growing number of 80–100MW large-scale developments, reflecting the current market trend toward higher-capacity facilities
- While data centers in the 80~100MW range increased steadily between 2021 and 2023, their growth has recently slowed due to regulatory measures such as the Power System Impact Assessment and local opposition
- In contrast, although fewer in number, small-scale data centers below 20MW have begun to appear in new permit cases

Power Receiving Capacity (MW) of Data Centers by Permitting Year (2020~2025)

Source Ministry of Land, Infrastructure and Transport, RSQUARE
※ Incl. Change of use



Data Center Supply

8.
Major Upcoming Data Center Development Projects in Korea (as of September 2025)

AMC	Asset/Project Name	Key Investor(s)	Operator / Tenant	Location	GFA(m²)	Power Receiving Capacity	IT Load	Permit Date	Construction Start	Expected Completion
Actis	Project TIMBUKTU	-	ADIK (Actis Subsidiary)	Ansan-si, Gyeonggi	74,041	100MW	65MW	2023.06.	2025.05.	2028
KDB Infrastructure AM	Incheon Dohwa DC	-	-	Michuhol-gu, Incheon	58,899	80MW	56MW	2023.04.	2026(F)	-
Mastern IM	Yeouido EDC	Hanwha Corp.	-	Yeongdeungpo-gu, Seoul	1,736	10MW	6.5MW	2024.09.	-	-
Wide Creek AM	Yongin Deokseong DC (Soul 1)	Warburg Pincus	-	Yongin-si, Gyeonggi	64,703	80MW	56MW	2023.08	2025.09.	2027
	Bupyeong DC	ESR, STACK Infrastructure	STACK(PDG Master Lease)	Bupyeong-gu, Incheon	55,769	80MW	48MW	2023.04.	2025.03.	2028
IGIS AM	Samsong IT Platform Center	-	-	Goyang-si, Gyeonggi	78,290	80MW	54MW	2022.08.	2023.06.	2026
	Ansan Global Cloud Center	Invesco	-	Ansan-si, Gyeonggi	49,590	40MW	25.8MW	2024.10	2025.01.	2027
CapitalLand IM	Goyang Hyang-dong SL3X	GIC, Equinix	Equinix	Goyang-si, Gyeonggi	21,970	40MW	24MW	2022.06.	2025.02.	-
Capstone AM	Guro DC	-	KT Cloud	Guro-gu, Seoul	19,225	30MW	19.8MW	2022.12.	2023.12.	2028
	Olympus DC	-	-	Bucheon-si, Gyeonggi	26,187	-	-	2025.05.	-	-
Koramco AM	Siheung National Industrial Complex DC	DCI	DCI	Ansan-si, Gyeonggi	26,685	40MW	27MW	2023.11.	2025[1)]	2028
	Busan Jangnim DC	LF, GS E&C	LG Uplus	Saha-gu, Busan	46,877	40MW	25.2MW	2024.07.	2026(F)	-
	Uijeongbu DC	-	-	Uijeongbu-si, Gyeonggi	23,480	20MW	12MW	2024.07.	2026(F)	-
Pacific AM	Bucheon Naedong DC	CPPIB	-	Bucheon-si, Gyeonggi	26,080	100MW	-	2023.05.	2026(F)	2030
	Bucheon Peach DC	-	KT Cloud	Bucheon-si, Gyeonggi	71,160	80MW	48MW	2022.07.	2023.04.	2026
	Guro Hang-dong DC	CPPIB	-	Guro-gu, Seoul	45,156	80MW	52MW	2023.08.	2025.02.	2029
Korea Alternative AM	KAAM Square Ansan Data Center	POBA	Kakao Enterprise	Ansan-si, Gyeonggi	76,459	80MW	48MW	2024.10.	2024.12.	Phase 1 – 2027 Final – 2028

Source RSQUARE

1) The initial construction start date was December 26, 2023, and the project is scheduled to restart following design modifications

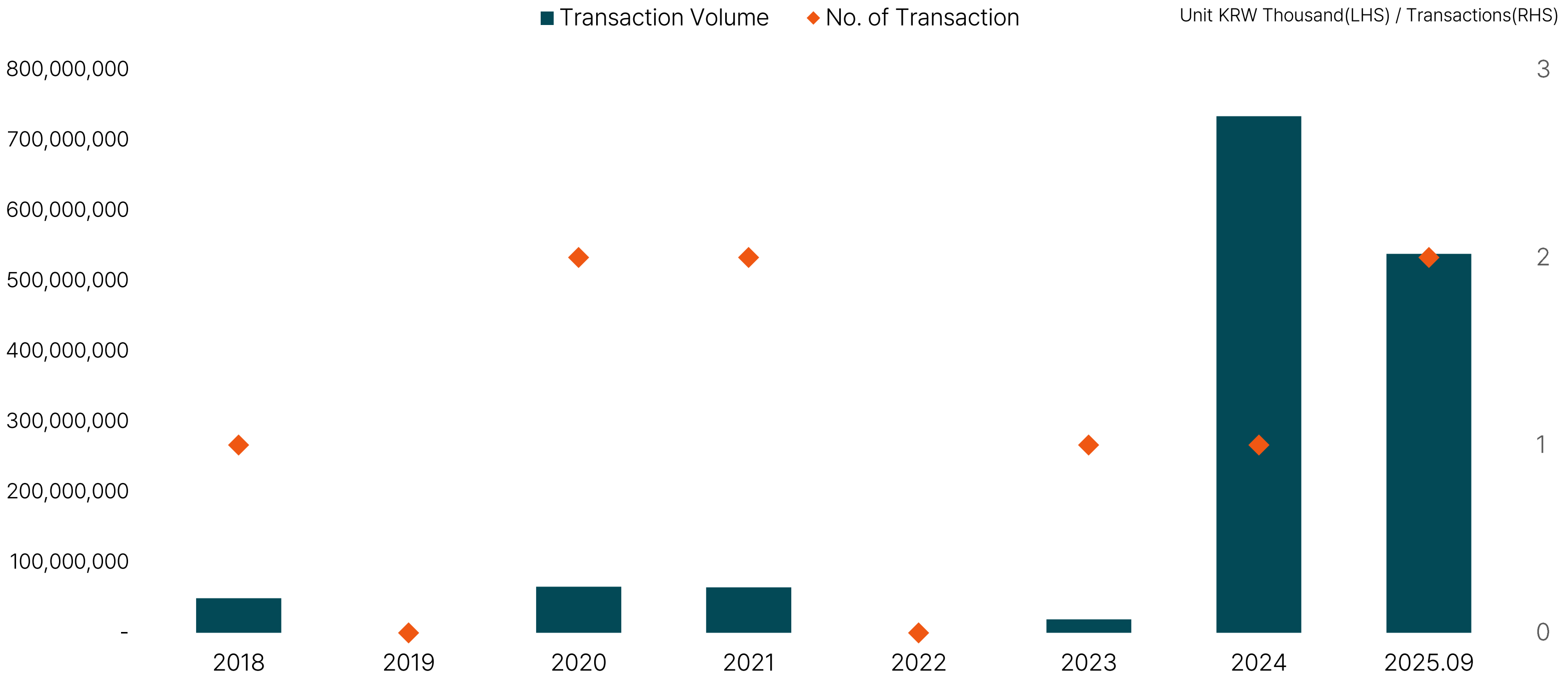
4 Data Center Investment

Data Center Investment Market

1. Data Center Transactions

- efore 2020, domestic data center transactions were extremely limited, averaging only one deal per year
  Since then, the number of transactions has gradually increased
- Until 2023, annual transaction volumes remained below KRW 100 billion, but in 2024, the acquisition of the *Hanam Data Center* by Macquarie significantly boosted that year's total. In 2025, transaction volume surged again exceeding KRW 500 billion driven by the *SK AX Pangyo Data Center* deal.
- Looking ahead, as more asset manager owned data centers enter the market, both transaction volume and deal count are expected to continue rising.

Trends in Domestic Data Center Transactions



Source RSQUARE

Data Center Investment Market

2. Major Data Center Transaction Cases

- Most data center transactions have occurred within the Seoul metropolitan area, where market activity remains concentrated. Since 2020, asset managers have increasingly participated in data center acquisitions, reflecting growing institutional interest in the sector
- In addition to completed facilities, development sites and project rights have also changed hands, signaling broader market participation from asset managers, corporations, and operators. This trend suggests that notable transaction cases are expected to continue increasing in the near future

Source RSQUARE

Asset Name	Location	GFA(m²)	Power Receiving Capacity (IT Load)	Completion Year	Transaction Date	Transaction Value(KRW 100M)	Seller	Buyer	Key Investor
Dreammark1 Guro IDC	Guro-gu, Seoul	23,146	10MW	2004	2018.08	490	Shinsegae I&C	Dreammark 1	-
Bundang Hostway IDC	Seongnam-si, Gyeonggi	14,533	12.5MW	2000	2020.10	430	JB Asset Management	Koramco Asset Management	IGIS Value Plus REITs
Hanam Data Center	Hanam-si, Gyeonggi	41,919	40MW(25.44MW)	2023	2024.08	7,340	IGIS Asset Management	Green Digital Infra	Macquarie Korea Infrastructure Fund
Sejong Telecom Bundang IDC	Yongin-si, Gyeonggi	8,816	6.75MW(2.63MW)	1998	2025.07	315	Hana Alternative Asset Management	Pine & Partners Asset Management	TPG Angelo Gordon
SK AX Pangyo IDC	Seongnam-si, Gyeonggi	67,024	30MW	2014	2025.07	5,068	SK AX (formerly SK C&C)	SK Broadband	-

Data Center Operations by PE/AMC

Data Center Operator

- Global investors and asset managers are rapidly expanding their presence in Korea through data center operators they have established or invested in. Operators with proven track records abroad such as STT GDC, Empyrion Digital, DCI, and STACK are actively launching new projects in the Korean market
- Their market entry typically begins in the Seoul metropolitan area, where demand is strongest, and many are now directly undertaking development projects in addition to operations

Source RSQUARE

PE/AMC	PE/AMC Nation	Established / Invested Operators	Data Centers Currently Operating in Korea
Temasek Holdings	Singapore	STT GDC	STT Seoul 1(2026)
Actis	United Kingdom	ADIK	Ditto Yangpyeong Center, Epoch Anyang Center
Stonepeak Infrastructure Partners	United States	Digital Edge	SEL1, SEL2, PUS1
Seraya Partners	Singapore	Empyrion Digital	KR1 Gangnam
Gaw Capital	Hong Kong	Dream Mark1	Guro IDC, Incheon IDC
Black Stone	United States	QTS Realty Trust	-
		AirTrunk	-
Brookfield Asset Management	Canada	DCI	SEL01, SEL02(2028)
Warburg Pincus	United States	DC Connects	Soul 01(2027)
		PDG(Princeton Digital Group)	Bupyeong Data Center (Master Lease) (2028)
Blue Owl Capital	United States	STACK Infrastructure	Bupyeong Data Center (Operating) (2028)

5 Data Center Lease

Data Center Service

Classification by Data Center Service

Category		Description	Representative Companies (Brands)
Colocation	Power-Based	Based on contracted power capacity (e.g., 100 kW, 500 kW). This has become the dominant model in the global colocation market	Equinix, NTT Global Data Centers
	Rack-Based	Leasing standard rack units (Full/Half/Quarter), a package model suitable for startups and SMEs	KDDI Telehouse, Cyxtera
	Space-Based	Leasing a specific area (m^2) within a data center, allowing flexible rack installation and power contracting as per tenant needs	Equinix, Digital Realty
	Virtual IDC	Hosting and colocation services without establishing an independent IDC; tenants lease designated space (typically full-floor)	Equinix, NTT Global Data Centers
Hosting Service	Web Hosting	Companies lease hardware and network bandwidth to provide domain-based internet services. The segment has declined with the rise of cloud adoption	GoDaddy, Bluehost
	Server Hosting	Provides server and storage resources to operate internet services; however, its market relevance has weakened due to the shift toward cloud computing	OVHcloud, Hetzner
Managed Services		Includes system operations and maintenance managed by IDC operators, expanding to cover security, compliance, and AI workload optimization	IBM, Rackspace
Data Center Construction (Relocation) Consulting		Covers design, supervision, and construction support, incorporating energy efficiency and ESG elements	Schneider Electric, ABB
Value-Added Services		Traditional services such as security, backup, and disaster recovery (DR), now expanded to include energy monitoring, ESG reporting, and carbon-neutral certification	Veeam, Palo Alto Networks

Source KDCC, RSQUARE

Colocation

Colocation Rent Calculation Model

1.
Power Capacity Unit (Power Capacity-Based Colocation)

A lease structure in which tenants contract based on the data center's available power capacity (kW), while actual power usage (kWh) is billed separately

① Flat / Allocated

Lease Structure
Contracted Power Capacity (kW) × Rent per kW(Base Lease Income) + Power Usage Fee

Characteristics
1. A fixed power capacity (kW) is contracted at a flat monthly rate, resulting in consistent rent regardless of actual usage

2. Additional power expansion requires a separate contract

Advantages
Stable Net Operating Income (NOI)

Disadvantages
Requires separate negotiation and additional cost for power expansion or reduction

② Metered

Lease Structure
Contracted Power Capacity (kW) × Rent per kW(Base Lease Income)
+ Excess Usage (kW) × Rent per kW (Additional Revenue)
+ Power Usage Fee

Characteristics
Hybrid cost structure with fixed base and variable excess components
If average power usage exceeds the contracted capacity, the excess portion is billed additionally

Advantages
Cost flexibility for services with volatile power demand (e.g., streaming, content delivery)

Disadvantages
Higher revenue volatility, requiring minimum usage guarantee clauses

Example)

Type	Contract / Usage Condition	Monthly Base Rent + Additional Rent	Monthly Fixed Rent	Power Usage Fee (Pass-Through)	Total Monthly Cost
Flat	Contracted 1,000 kW	Contracted Power 1,000 kW × KRW 300,000	KRW 300,000,000	1,000 kW × 720 h = 720,000 kWh × KRW 120 = KRW 86,400,000	KRW 386,400,000
Metered	Contracted 500 kW, Excess 150 kW	(Contracted 500 kW × KRW 300,000) + (Excess 150 kW × KRW 350,000)	KRW 227,500,000	650 kW × 720 h = 468,000 kWh × KRW 120 = KRW 56,160,000	KRW 283,660,000

Colocation

2.
Rack-Based Colocation

Monthly flat rent by rack unit (Full / Half (1/2) / Quarter (1/4))

Lease Structure

Rack Rent(Rent per Rack)) + Excess Usage (kW)*Rent per kW(Additional Revenue) + Power Usage Fee

Advantages

Simple billing, fast deployment, low initial fit-out cost

Disadvantages

Per-rack kW limit leads to steep extra power charges for high-density gear

Example)

Rack	Monthly Rack Rent	Included Power	Excess Power Charge	Power Usage Fee (Pass-Through)	Total Monthly Cost
Full Rack(42U)	KRW 1,100,000	2.2 kW	KRW 220,000 per 1 kW If using 4 kW (1.8 kW excess): 1.8 kW × 220,000 = KRW 396,000	4 kW × 720 h = 2,880 kWh × KRW 120 = KRW 345,600	KRW 1,841,600

3.
Space-Based Colocation

Leases white space delineated by area units (m², pyeong), with additional charges for contracted power capacity

Lease Structure

Contracted area (m²) × Rent per m²(White Space Rent) + Contracted Power (kW) × Rent per kW (Power Rent) + Power Usage Fee + Initial Fit-out Cost

Advantages

High customizability and scalability including multiple racks, non-standard racks, dedicated cooling/security

Disadvantages

Minimum lease area requirement, higher upfront construction cost

Example)

Type	Description	Monthly White Space Rent	Base Power Charge	Power Usage Fee (Pass-Through)	Initial Fit-Out Cost	Total Monthly Cost
Cage	Open floor area enclosed with steel mesh	20 m² × KRW 150,000 = KRW 3,000,000	80 kW × KRW 50,000 = KRW 4,000,000	80 kW × 720 h = 57,600 kWh × KRW 120 = KRW 6,912,000	Cable/PDU install, access control KRW 8,000,000 (one-time)	KRW 13,912,000 / month + fit-out
Room	Fully enclosed room with walls and door	20 m² × KRW 170,000 = KRW 3,400,000	80 kW × KRW 50,000 = KRW 4,000,000	80 kW × 720 h = 57,600 kWh × KRW 120 = KRW 6,912,000	Additional air containment and fire-protection works KRW 12,000,000 (one-time)	KRW 14,312,000 / month + fit-out

Data Center Players

In Korea, various players including key telecommunications operators, CSPs, and domestic and global colocation OpCos are engaged in data center leasing and operations

Category	Key Telecommunications Operator			IT Service Provider				Global Operator					
Provider	**KT Cloud**	**LG UPLUS**	**SK Broad Band**	**LG CNS**	**SK AX**	**Lotte Innovate**	**Samsung SDS**	**Digital Edge**	**Digital Realty**	**ADIK**	**DCI**	**EQUINIX**	**Empyrion Digital**
No.	19	16	7	7	3	4	5	3	2	3	2	3	1
	• Cheongju AIDC • Bundang DC • Songjeong GHC • Namguro DC • Yeouido DC • Daejeon DC • Mokdong 2 DC • Cheonan CDC • Gangnam DC • Mokdong 1DC • Yongsan DC • Baekseok DC • Gasan DC • Gyeongbuk AI CDC • Gimhae GDH • Peach DC(F) • Guro DC(F) • Meta Infra AsanIDC(F) • Yeouido EDC(F)	• Nonhyeon DC • Choryang DC • Seocho 1 DC • Gwangju DC • Daejeon DC • Seocho 1 DC • Anyang DC • Daegu DC • Ami DC • Sangam DC • Gasan DC • Pyeongchon Mega Center • Pyeongchon 2nd DC • K-Square DC Gasan • Paju AI Center(F) • K-Square Busan Jangnim DC(F)	• Gasan Data Center • Bundang Data Center (1&2) • Seocho Data Center • Ilsan Siksadong Logistic Complex (Logistics & Data Center Facility) • Yangju DC • Ilsan DC • Busan Geumsa DC(F)	• Incheon IT Center • Busan Global Cloud Data Center • Sangam IT Center • Hanam Data Center • Yongin Jukjeon Pacific Sunny Data Center • Gasan IT Center • KATI Chungju Data Center (F)	• Daedeok Data Center • Boramae Data Center • Pangyo Data Center	• External and Global Centers • Seoul 1st Center • Disaster Recovery Center • Global Cloud Center	• Gumi DC • Chuncheon DC • Dongtan DC • Sangam DC • Suwon DC	• PUS1 • SEL1 • SEL2	• ICN10 • ICN11 (F)	• Epoch Anyang Center • Ditto Yangpyeong Center • TIMBUKTU(F)	• DCI SEL 1 • DCI SEL 2(F)	• SL1 • SL2x • SL3x (F)	• KR1 Gangnam AI Campus

Source Each Company's Website, RSQUARE

Colocation Rent

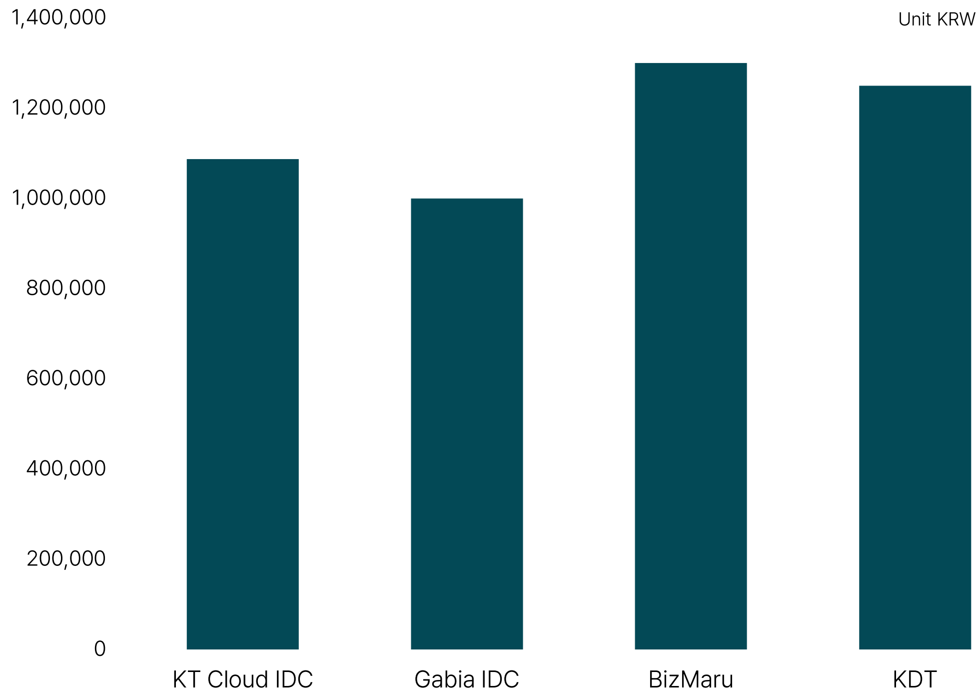
- Monthly rack rents in Korean data centers are typically structured by size ¼ rack, ½ rack, and full rack with a standard 2.2 kW of base power included for full racks
- The 2.2 kW capacity is suitable for low-density racks, creating a clear rental price gap compared to high-density racks used in AI data centers that consume tens of kW

1. Colocation Operator Rents(2025)

Source Each Company's Website

Operator	Rack Type	Monthly Rent(KRW)	Base Power	Additional Power Rate (KRW)
KT Cloud IDC	1/4 Rack	436,000	2.2kW	KRW 220,000 per 1.1kW
	1/2 Rack	653,000	2.2kW	KRW 220,000 per 1.1kW
	Full Rack	1,087,000	2.2kW	KRW 220,000 per 1.1kW
Gabia IDC	1/4 Rack	300,000	0.55kW	-
	1/2 Rack	550,000	1.1kW	-
	Full Rack	1,000,000	2.2kW	-
BizMaru	1/4 Rack	330,000	0.55kW	-
	1/2 Rack	750,000	1.1kW	-
	Full Rack	1,300,000	2.2kW	-
KDT	1/4 Rack	400,000	-	-
	1/2 Rack	850,000	-	-
	Full Rack	1,250,000	2.2kW	-

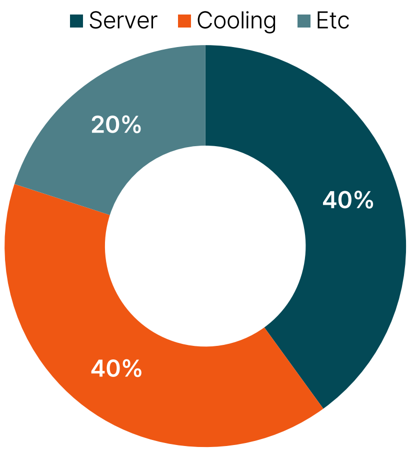
2. Colocation Operator Rent Comparison Chart



Data Center Power

- The largest operational cost driver in data centers is power consumption, making the improvement of power efficiency (PUE) a key focus for operators and investors alike
- Within a data center, electricity is primarily consumed by servers, followed by cooling systems, power distribution equipment, network systems, and storage
- Recently, AI data centers have seen a sharp rise in rack-level power consumption due to the adoption of high-power GPUs such as NVIDIA GB200 and B200
  → In October 2025, NVIDIA announced plans to supply 260,000 GPUs to Korea, including the GB200, a hybrid model combining the Grace CPU with two Blackwell B200 GPUs. The GB200 delivers approximately 30× higher token processing speed and 4× faster model training compared to the widely used H100 GPU.

1. Power Consumption Breakdown in Data Centers



Source ABB, IEA

2. Comparison of Power Consumption by NVIDIA GPU Model

- TDP (Thermal Design Power) represents the maximum amount of heat generated by a GPU during operation, indicating the maximum power the GPU can consume under normal conditions, measured in watts (W)
- As AI data centers increasingly adopt GPUs equipped with high-performance memory, the required TDP levels have been steadily rising

GPU	Announced Year	Memory	TDP(W)
V100	2017	32GB	300
A100	2020	80GB	400
H100	2022	80GB	700
H200	2023	141GB	700
B200	2024	180GB	1,000
B300	2025	270GB	1,100
GB200(CPU+GPU 2)	2024	186GB	1,200
GB300(CPU+GPU 2)	2025	279GB	1,400

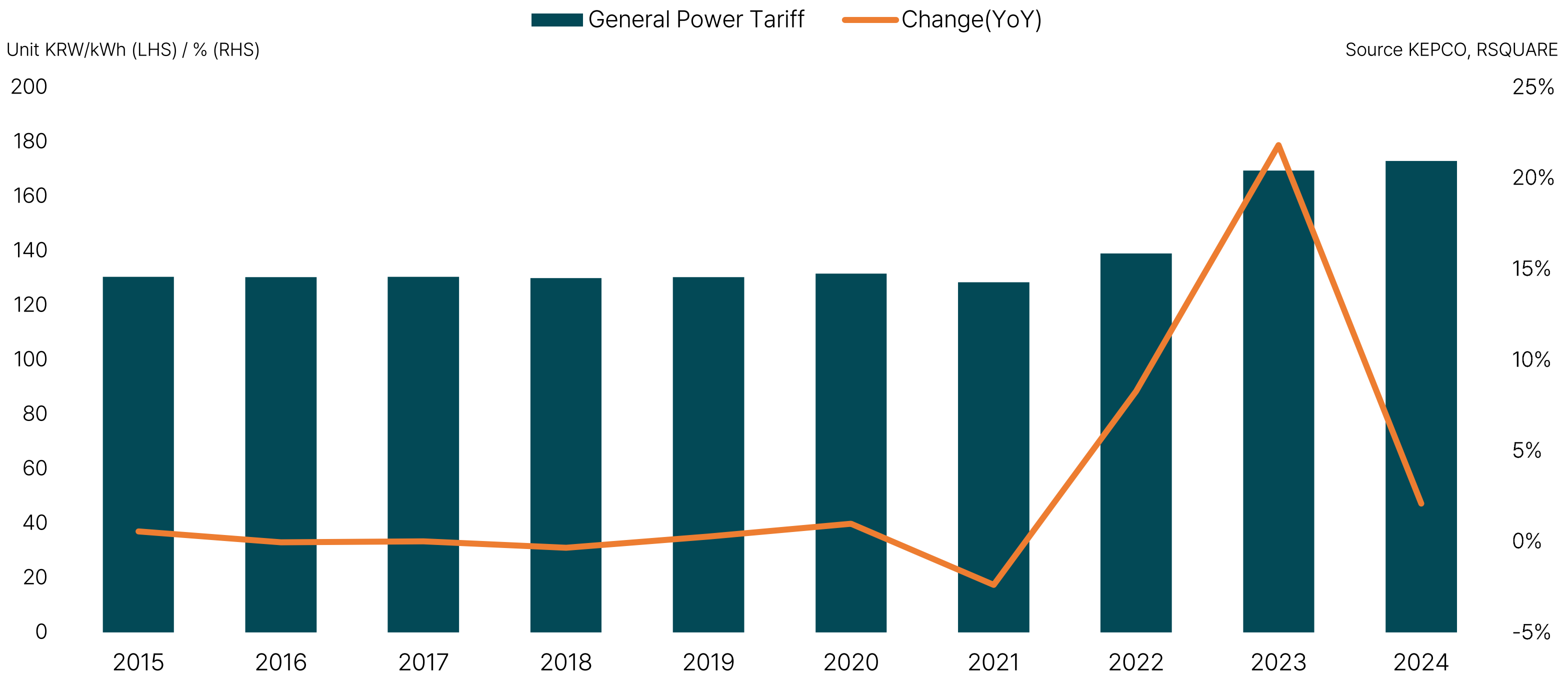
Source NVIDIA
※ TDP values are based on the SXM (Server eXtended Module) form factor

Data Center Power

Changes in General Power Tariffs in Korea

- Private data centers in Korea are billed under General Power (Type B, High Voltage) rates, which have been steadily increasing, with the winter season (November–February) marking the annual price peak
- During 2021–2022, international LNG and coal prices surged, driving up power generation costs. However, these were not fully reflected in retail electricity prices, resulting in KEPCO's record operating loss of KRW -32.6 trillion in 2022. To offset this, electricity tariffs were raised by 21.8% in 2023 compared to the previous year, directly impacting data center operating costs
- From 2015 to 2024, general power tariffs increased at a compound annual growth rate (CAGR) of 2.86%, and this upward trend is expected to play an increasingly critical role in future data center leasing and operational cost structures

Trends in General Power Tariffs in Korea



6 Data Center Issues

Data Center Development Challenges

- Public concern over potential electromagnetic waves generated by data centers often leads to project delays or cancellations
- Many residents express apprehension about EM waves exposure from the dense concentration of servers and high-voltage transmission lines connected to data centers
- In addition to EM waves concerns, issues such as noise, heat island effects, and environmental impact have been raised, emphasizing the need to address these factors to ensure stable and sustainable data center development

Source RSQUARE

Developer	Location	Main Objections from Residents	Development Issue
Everyshow	Anyang, Gyeonggi-do	Electromagnetic waves, noise	Project canceled and site sold
Naver	Yongin, Gyeonggi-do	Electromagnetic waves, environmental destruction	Project canceled
Digital Realty	Gimpo, Gyeonggi-do	Leakage of electric potential, heat island effect	Construction in Gimpo suspended
GS E&C	Goyang, Gyeonggi-do	Electromagnetic waves, noise, heat island effect	Construction delayed
NHN Cloud	Gimhae, Gyeongsangnam-do	Electromagnetic waves, heat island effect	Project canceled
AWS	Seo-gu, Incheon	Electromagnetic waves	Construction delayed
Digital Edge	Bupyeong, Incheon	Electromagnetic waves	Construction temporarily halted
Hayang Energy Development	Guro-gu, Seoul	Electromagnetic waves, noise, heat island effect	Construction delayed

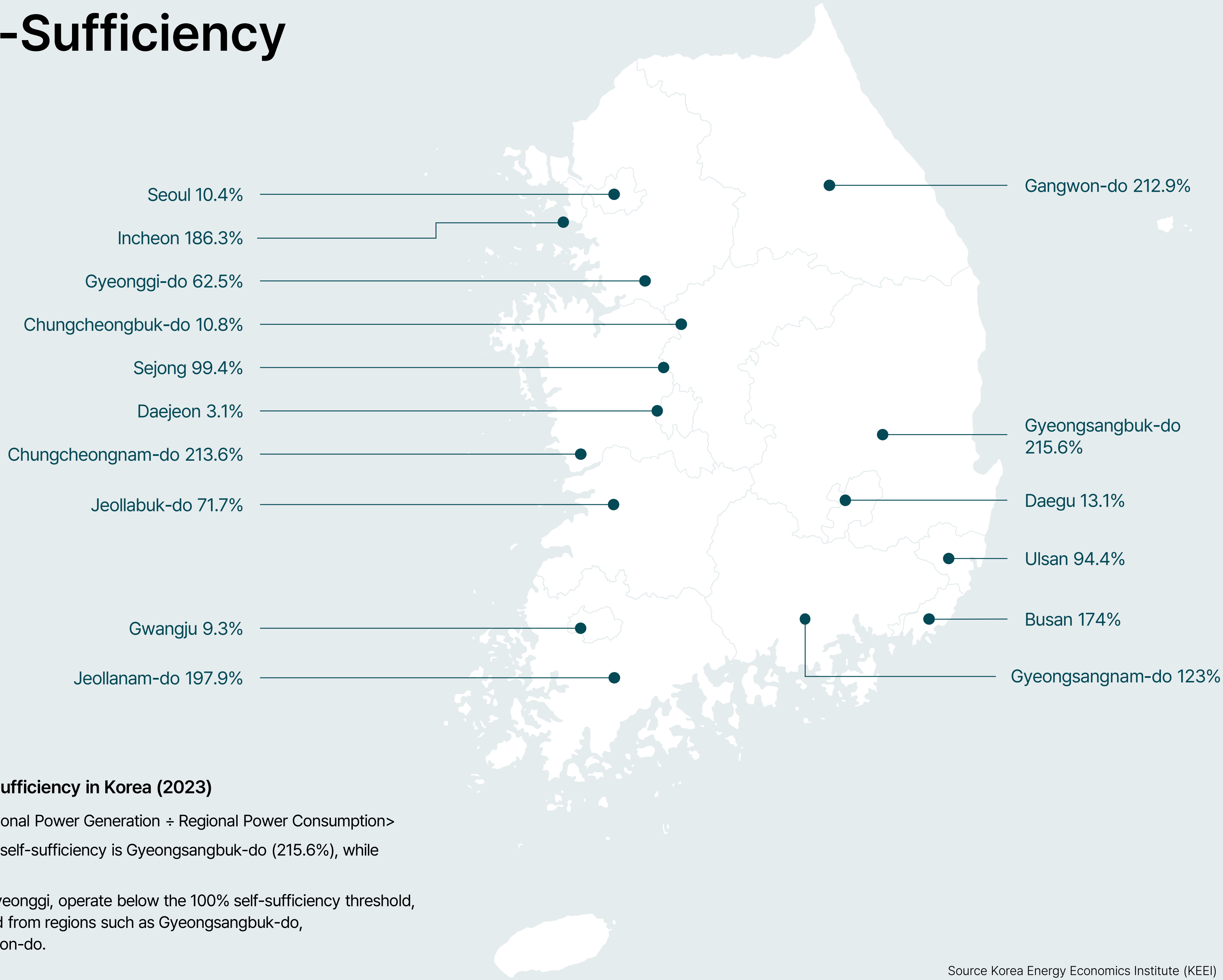
- Ministry of Science and ICT (MSIT) measured EM waves intensity from high-voltage lines at six domestic data centers, hospitals, shopping malls, convention centers, and hotels in Aug–Sep 2025 and found all readings at only about 1% of the ICNIRP human exposure limit

Average EM waves at six data centers	0.4%
Hospital	0.68%
Shopping Mall	0.19%
Convention Center	1.03%
Hotel	1.17%

* Korea adopts the WHO-recommended ICNIRP guideline, with a 60 Hz high-voltage line exposure limit of 833 mG

- According to Mirae Radio Wave Engineering Institute, EM waves from data center power facilities is comparable to an electric rice cooker, and EM waves at *Naver's Gak Chuncheon* Data Center is about 1% of a household microwave oven level (29.2 mG)
- Additional issues remain, including heat-island effects and cooling tower noise, underscoring the need for early consultation with local communities

Power Self-Sufficiency Issue



Status of Regional Power Self-Sufficiency in Korea (2023)

<Power Self-Sufficiency Ratio = Regional Power Generation ÷ Regional Power Consumption>

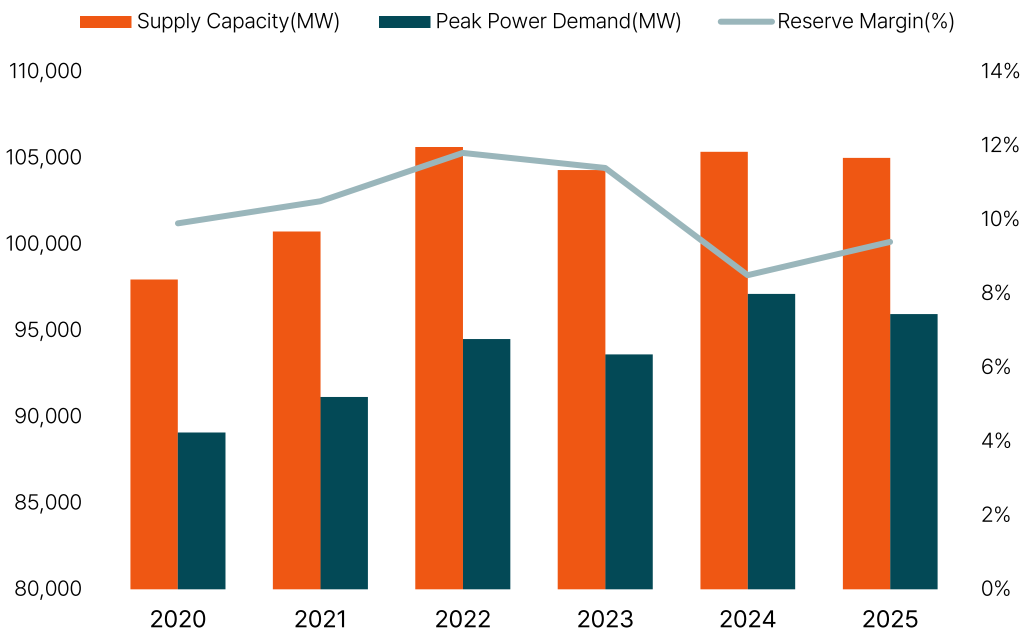
- The region with the highest power self-sufficiency is Gyeongsangbuk-do (215.6%), while Daejeon (3.1%) records the lowest.
- Most areas, including Seoul and Gyeonggi, operate below the 100% self-sufficiency threshold, relying on surplus power generated from regions such as Gyeongsangbuk-do, Chungcheongnam-do, and Gangwon-do.

Source Korea Energy Economics Institute (KEEI)

Power Supply–Demand Trends in Korea

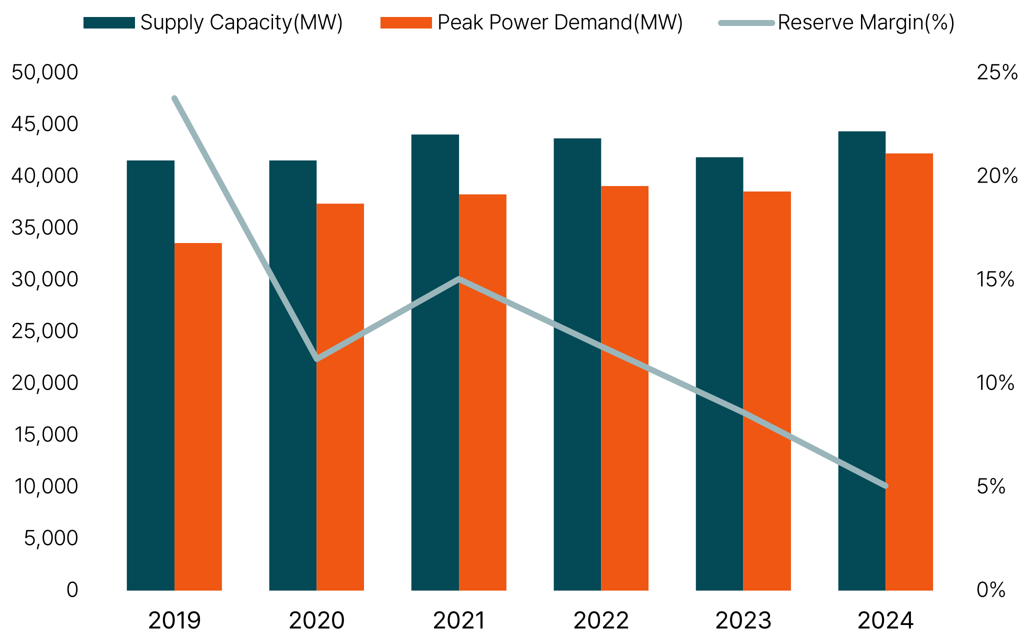
Nationwide Power Supply–Demand Trends

Source EPSIS, RSQUARE
※ Reserve margin = (Supply Capacity – Peak Demand) / Peak Demand × 100



Seoul Metropolitan Area Power Supply–Demand Trends

Source MOTIE, RSQUARE
※ Reserve margin = (Supply Capacity – Peak Demand) / Peak Demand × 100



- Nationwide supply capacity has seen little change since 2022, while peak power demand increased in 2024, pushing the national reserve margin during peak hours below 10%
- In the Seoul metropolitan area, peak demand has risen faster than supply capacity since 2019, and the reserve margin has continued to decline after a brief rebound in 2021
- The metro area consistently accounts for over 41% of national peak demand, reaching 43.5% in 2024, incentivizing the redistribution of power-intensive data center development to non-metro regions

※ A stable reserve margin is 10% or higher; if issues reduce reserves to 0%, Korea's nationwide blackouts like those in 2011 can occur

Data Center,
Strategies to Decentralize Concentration in the Seoul Metropolitan Area

The Korea's 2025 policy direction focuses on developing regionally distributed data centers to ease concentration in the Seoul metropolitan area and promote deployment around regional hubs

1.
Revision of Regulations on the Establishment and Consultation Procedures for Energy Use Plans (2023)

Strengthened consultation requirements for energy use plans

Facilities with electricity consumption exceeding 5MW must undergo an adequacy review using the results of KEPCO's Power Supply Notification during the consultation process

This measure aims to decentralize large-scale power demand concentrated in the Seoul metropolitan area

2.
Special Act on the Activation of Distributed Energy
(Enacted on June 13, 2023 / Effective from June 14, 2024)

Introduction of the Power System Impact Assessment

Projects that consume or plan to consume 10MW or more of electricity are required to undergo a Power System Impact Assessment

Assessment Targets and Submission Deadline

The following entities must submit the assessment report at least three months prior to applying for project plan approval or building permits

1) Businesses entering into a new electricity supply contract of 10MW or more with a power sales company
2) Existing users increasing contracted capacity from below 10MW to 10MW or more
3) Cases where the additional contracted capacity itself exceeds 10MW

Mandatory Submission of Distributed Energy Installation Plans

For new construction or major renovation of buildings expected to consume 200,000 MWh or more annually, a Distributed Energy Installation Plan must be submitted

→ Annual power consumption of 200,000MWh corresponds to approximately 12.7–17.6MWh of hourly IT equipment energy use

Annual power consumption calculation

1) 200,000MWh ÷ 8,760 hours = 22.83MW (hourly total facility energy use)
2) 22.83MW ÷ PUE = hourly IT equipment energy use

Source Ministry of Government Legislation, RSQUARE

7 Data Center Trends

Edge Data Center, EDC

Edge: A method of processing data directly at the edge of the network, referring to the location closest to the user, device, or data generation point

- Edge data centers, also known as distributed data centers, are small-scale facilities strategically located near end users within urban or business districts
- Designed to minimize data transmission latency and distribute workloads that were previously concentrated in central data centers, thereby enhancing response speed and system reliability
- With the rapid growth of AI and IoT, edge data centers are becoming an increasingly important segment within the broader data center market

1. Comparison of EDC and Hyperscale

Source RSQUARE, KDCC

Category	EDC	Hyperscale
Power Receiving Capacity	150~5,000kW	40MW and more
No. of Racks	1~49	10,000 and more
IT Space	100~5,000m²	37,161m² and more
Development period	6-12 months	Approximately 3 years
Location	Business District	Mostly Suburban Area
Manpower	Minimum Staffing	Large Number of Onsite Personnel
Regulation	Minimal Regulation	Heavily Regulated During Construction

2. Advantages of Edge Data Centers for Regulatory

- Edge data centers typically operate with power usage below 10MW, exempting them from the Power System Impact Assessment requirement
- Additionally, facilities using less than 5MW are not obligated to submit a Power Supply Notification Form
  → These regulatory flexibilities have recently driven the expansion of edge data centers within Seoul

Source Ministry of Government Legislation

Applicable Law	Requirement	Evaluation / Notification Criteria	Exemptions for EDCs
Special Act on the Activation of Distributed Energy	Power System Impact Assessment	Required for facilities with power receiving capacity of 10MW or more	Exempt if capacity is below 10MW
Enforcement Decree of the Electric Utility Act	Power Supply Notification	Required for facilities planning to receive 5MW or more	Not required if capacity is below 5MW

AI Data Center, AIDC

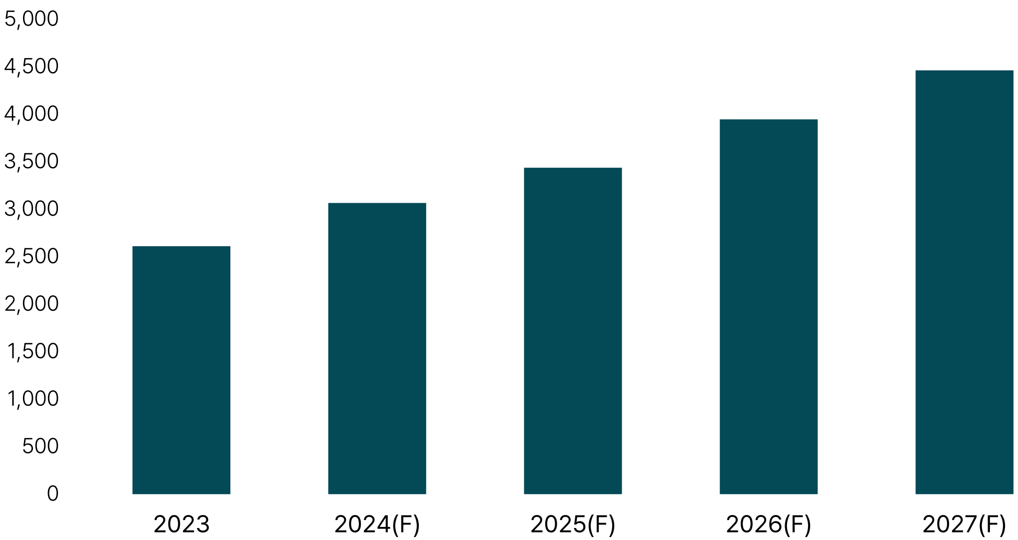
Difference from Conventional IDCs
IDC – Focus on hosting web and video services using CPU-based servers
AIDC – Designed for high-speed computing to support AI model training and large-scale data analytics, utilizing GPU and NPU-based architectures

- An AI Data Center (AIDC) refers to a dedicated facility designed to handle large-scale AI workloads, including machine learning training and inference, equipped with high-performance GPUs, high-bandwidth networks, advanced storage systems, and efficient cooling solutions
- Driven by the rapid global expansion of generative AI platforms such as ChatGPT and Perplexity, demand for AI data centers is accelerating both domestically and worldwide
- AI-dedicated racks typically operate at 30–80 kW, with some overseas facilities requiring up to 90–100 kW per rack

1.
Korea AI Market Size Outlook(2023)

Unit KRW 1 Billion

Source IDC



2.
Rack Density by Data Center Usage (2024–2025)

** Rack Density (kW/rack) refers to the total power consumption of IT equipment installed in a single rack, measured based on IT load*

- Design Implication: Rack density is directly linked to power supply capacity and cooling requirements
- IDC vs AIDC: While conventional IDCs typically average below 8 kW per rack, AIDCs require significantly higher densities of 30–60 kW per rack, with some projects reaching 80–100 kW per rack depending on configuration and workload

Source Uptime Institute, NVIDIA, Vervtiv

Category	Internet Data Center (IDC)	Cloud Data Center (CDC)	AI Data Center (AIDC)
Purpose	General colocation	Support large-scale cloud workloads	Specialized for high-density GPUs for AI training and inference
Rack Power Density (Avg.)	7.1 kW/rack	10–20 kW/rack	30–60 kW/rack
Primary Cooling Method	Air-cooling centric	Air-cooling plus partial liquid-cooling	Liquid-cooling centric, hybrid configurations common

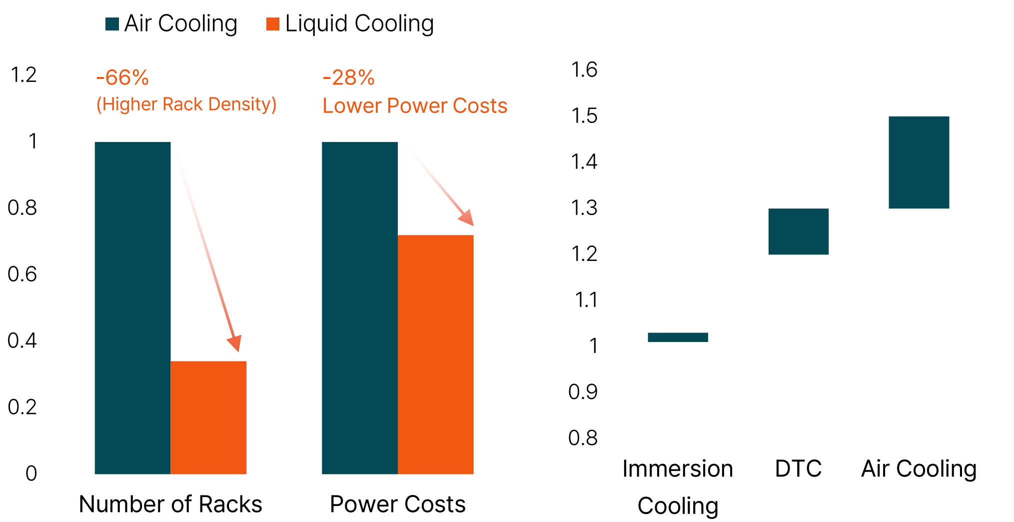
AI Data Center, AIDC

- In high-density, high-power AI workloads, air cooling alone reaches thermal limits, making liquid solutions (DTC, immersion) advantageous in energy efficiency and operating costs
- A hybrid configuration retaining air cooling for general servers while applying liquid cooling to high-heat devices such as GPUs is rapidly spreading, especially for high-density racks where it improves economics

3.
Comparison of Air and Liquid Cooling

※ Air Cooling = 1

Source Shinhan Securities



4.
Data Center Cooling Methods Comparison Table

Source Ashrae, UTI, Open Compute Project, Vertiv

Category	Air Cooling	DTC (Direct-to-Chip)	Immersion Cooling
Basic Principle	Fans circulate chilled air to remove server heat	Coolant flows through cold plates to absorb heat directly from CPUs/GPUs and other hot components	Servers are partially or fully submerged in dielectric fluid to remove heat
Heat Removal Performance	Low	High	Very high
Rack Power Density	Low to medium	High (economical at ≥20 kW/rack)	Very high (no airflow constraint)
Energy Efficiency	Moderate (air handling overhead)	High (reduced fan power, supports high-temperature or dry cooling)	Very high (minimal server fan use, reduced reliance on chilled water)
Maintenance	Easy (simple ops and filter management)	Medium (leak risk management, fluid quality control)	Difficult (fluid handling and contamination control)
Cost	Low	High	Very high
Space Efficiency	Low	Medium	High

Data Center, ESG

1. Data Center Environmental Metrics

- Data centers operate 24/7 with high-density IT loads and continuously running cooling and power infrastructure, resulting in high power intensity and requiring systematic efficiency management
- Performance is assessed using multidimensional KPIs—not a single metric including power (PUE), water (WUE), carbon (CUE), and energy reuse (ERF/ERE)

Source ISO, RSQUARE

Category	Power Efficiency	Water Usage	Carbon Emissions	Energy Reuse	
Metric	PUE (Power Usage Effectiveness)	WUE (Water Usage Effectiveness)	CUE (Carbon Usage Effectiveness)	ERF (Energy Reuse Factor)	ERE (Energy Reuse Effectiveness)
Definition	Ratio of total facility energy to IT equipment energy	Ratio of annual water use during operation to IT energy	Ratio of annual greenhouse gas emissions (CO_2e) to IT energy	Share of total energy reused outside the data center	Efficiency of energy remaining in the data center after reuse relative to IT energy
Formula	Total facility energy ÷ IT equipment energy (kWh)	Annual water use ÷ IT energy (kWh)	Annual CO_2e emissions ÷ IT energy (kWh)	Reused energy outside DC ÷ total facility energy	(Total facility energy – reused energy) ÷ IT energy = (1 – ERF) * PUE
Unit	PUE ≥ 1.0 (lower is better)	L/kWh (lower is better)	$kgCO_2e/kWh$ (lower is better)	% (higher reuse share is better)	ERE ≥ 0 (lower is better)
Standard	ISO/IEC 30134-2	ISO/IEC 30134-9	ISO/IEC 30134-8	ISO/IEC 30134-6	-

Eco-Friendly Data Center

1. Green certifications for data centers

Data centers are energy and water intensive due to high density IT loads and 24/7 operations, requiring simultaneous management of operational efficiency and environmental performance, supported by standardized efficiency and environmental KPIs and certification frameworks

① Korea(GDC): Certification is scored as 80 points for infrastructure efficiency metrics (e.g., PUE) + 20 points for green activity indicators + up to 5 bonus points, assigning grades Bronze, Silver, Gold, and Platinum

② Global(LEED v4.1): Applies evaluation across energy, water, and O&M in new construction and operations, with growing adoption in Korean DC projects and an increasing number of certifications since 2024

2. Eco-Friendly Data Center Certification Status

Green Data Center (GDC) Certification

Source KDCC

Category	PUE	Points	Representative Certified Data Centers
Platinum	~1.40	80~100	Samsung SDS Chuncheon Data Center, Syntekabio ABS Data Center
Gold	1.41~1.50	70~80	KT Bundang IDC, KT Mokdong IDC2
Silver	1.51~1.60	60~70	KT Mokdong 1 IDC, SK AX (formerly SK C&C) Daedeok Data Center
Certified	1.61~1.70	50~60	SKT Dunsan IDC, Hyundai AutoEver Paju Data Center

- According to KDCC, the GDC accrediting body, a cumulative 23 centers obtained Green Data Center certification from 2012 (1st) to 2023 (12th)

LEED Certificated Korea's Data Centers

Source LEED

Facility	Location	LEED Version	Level	Points	Certification date
Naver Gak Chuncheon	Chuncheon	LEED 2009 NC v3	Platinum	95	05/22/2013
Naver Gak Sejong	Sejong	LEED v4 BD+C: Data Centers	Platinum	86	05/20/2024
Samsung Electronics DS Hwaseong HCP Center	Hwaseong	LEED v4 BD+C: Data Centers	Platinum	86	10/22/2024
Digital Edge SEL2	Incheon	LEED v4 BD+C: Data Centers	Silver	54	02/10/2025
Ditto Data Center	Seoul	LEED v4 BD+C: Data Centers	Silver	52	04/14/2025
SL2x Data Center	Goyang	LEED v4 BD+C: Data Centers	Silver	51	2024.07.08.
Kakao Data Center Ansan	Ansan	LEED v4 BD+C: Data Centers	Certified	48	2025.01.14.

Conclusion

Conclusion

The concept of **"Data Gravity"** refers to the phenomenon in which, as data accumulates, associated applications, services, and additional datasets are increasingly drawn to the same location. The term was first introduced in 2010 by Dave McCrory, and later popularized by Digital Realty through its Data Gravity Index (DGx), which quantifies the intensity of data gravity across different cities and industries.

With the rapid advancement of AI, the volume of data required for training and operations has grown exponentially. As data generation surges, the data gravity effect intensifies, driving up demand for servers that store and manage this data. Consequently, demand for data centers ranging from small-scale computer rooms to large hyperscale facilities has been rising sharply.

This surge in demand has translated directly into strong capital inflows, fueling a sustained boom in the global data center investment market. Barring any major disruptions, the sector is expected to remain active, supported by continued participation from a wide range of market players including end-users, operators, asset managers, and institutional investors.

Conclusion

However, the rapid surge in data center demand and the sector's overall expansion also bring forth critical challenges that must be addressed.

According to the International Energy Agency (IEA) 2025 report, global data center power consumption is projected to more than double from 415 TWh in 2024 to 945 TWh by 2030 within just six years. This sharp increase in electricity demand inevitably heightens environmental burdens, including greater CO_2 emissions from fossil fuel–based power generation and increased cooling water usage.

To mitigate these impacts, global initiatives such as Green Data Center Certification, LEED, and carbon emissions reporting systems (Scope 1, 2, 3) have been implemented. However, in Korea, the number of data centers with such environmental certifications remains limited, and regular carbon reporting is still uncommon.

The investment market has also experienced issues stemming from rapid growth. Some private individuals and companies have applied indiscriminately for power supply approvals from KEPCO not for actual development, but to resell approved sites for capital gains. These speculative applications have inflated the long-term power demand forecast in KEPCO's transmission and substation infrastructure plan by approximately 26 GW, leading to unnecessary investment costs and higher social burdens.

For the data center industry to sustain long-term growth and establish a healthy investment ecosystem, these environmental and regulatory challenges must be properly addressed.

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