Navigating the
India Data Centre Lifecycle

TRENDS & PERSPECTIVES

Foreword

Davendra Dabasia
Managing Director, International

mace

We predict that the next ten years will be an exciting period of digital maturity, which will take project delivery in India to the next level.

COVID-19 has introduced an unprecedented change to the business landscape in all industries across the world. For the construction industry, many sectors that were forecast to expand exponentially had to give way to opportunities in new areas for growth. As the world locked down following the coronavirus outbreak, and a huge proportion of the global population was forced to work and socialise remotely, data providers quickly experienced a surge in demand. The data centre sector was cast into the spotlight as one with great potential to flourish after the pandemic.

Perhaps nowhere in the world has this opportunity for growth become more apparent than in India. India is one of the world's most dynamic and emerging economies and one with vast commercial potential for technology providers. With a population of more than 1.3 Bn people, the country has an increasingly informed and tech savvy customer base which extends from urban to rural areas. Already, prior to the global coronavirus crisis, there was a growing demand for information storage and rapid expansion of cloud capacity.

This presents a lucrative market for global investors and data centre operators to expand into India. The winning formula for success is a combination of local knowledge around land ownership, government policies and power infrastructure, coupled with international best practice in data centre deployment from UK, Europe and North America.

The use of Building Information Modelling (BIM) throughout the data centre lifecycle will become increasingly more commonplace. A digital platform allows the various development components to come together from the design phase through to operations. BIM initiatives across the entire project scope can improve accuracy and efficiency and enable greater team collaboration on site.
In Europe, there is also an increasing trend towards the Rapid Data Centre (RDC), which uses modern methods of construction to minimise onsite construction, save time and increase quality. It will be interesting to see if the growth of Tier 2 and Tier 3 cities in India, which require the consumption of more and more data, will drive the need for data centres to be rapidly developed and thus call for the implementation of best practice around RDCs. We think that it will.

Above all, as the world navigates the continuous challenge posed by the coronavirus crisis, it is promising to see the opportunity for growth in the data centre sector in India. For global players in this space, from investors to construction companies and operators, this offers a chance to make a difference in one of the most dynamic and exciting markets in the world.

Anuj Puri
Founder & Chairman

ANAROCK
VALUES OVER VALUE

The world is going digital at a pace faster than expected. This is also driven in part by the pandemic induced 'Global Lockdown', that has resulted in a data surge arising out of increased digital social interactions and online transactions. From enterprises to individuals, usage of cloud services has increased to enable online mobility and easy sharing of data. These have enhanced the demand for data centre services globally.

India is on the verge of a new age of digital explosion. As one of the most populated countries in the world, rising mobile penetration is leading to significant data proliferation amongst its consumers. India offers a large base of global users for digital mediums such as social media apps, IOT devices and OTT platforms. With the expected 5G implementation and data localisation norms, the need for data storage to be closer to its users gains greater importance, with a view to measure down on latencies. The total 3rd party data centres industry is expected to move from the current 590[+] MW to ~2,000 MW in the next 2-3 years. With an additional capital waiting in the wings to support development of ~520 MW of data centres, one should expect significant capacity addition in India soon.

The Government of India has recognised digital infrastructure as an important focus area for the sustained growth of India.

Certain state governments have already provided incentives to encourage the building of large data parks. Implementing a national policy will further augment these initiatives and boost the industry. The first step towards this aim has already been initiated by the Government with the release of a draft national policy for data centres.

Data centres could very well end up bringing in significant foreign investments into India in the next few years, also leading to an entirely new framework of policies for the privacy of data, data warehousing, as well as exports.

This report titled, 'Navigating the India Data Centre Lifecycle: Trends and Perspectives' analyses the data centre industry landscape in India and projects industry trends in the coming years. It also showcases key perspectives through various stages of the lifecycle along with incorporating feedback received by us from the market participants.

There is lingering doubt over whether the current enthusiasm is sustainable and could potentially result in oversupply of data centre capacity. However, in comparison to global capacities on per capita basis, the India story seems ripe to scale. With strong fundamentals and adequate Government support, we believe there is a huge potential for India to become the new regional data hub in Asia-Pacific.

I hope you find the report insightful and engaging.

Contents

SECTION 1

India - The New Data Hub

The world is experiencing a data revolution. Data traffic is soaring higher than ever, especially since the pandemic induced lockdowns. Digital adoption has become critical for personal and business needs. It is expected that the volume of data generated worldwide in 2020 will be 59 Zetabyte (ZB), as against data centre storage capacity of 1 ZB, a mere 1.7%[1].

India has witnessed a digital thrust since the incumbent Government took charge in 2014. This improved focus by the Government on Digital India (a flagship program) to improve online infrastructure and increase digital literacy and penetration, set the ball rolling for several initiatives, leading to an unprecedented digital explosion.

Data consumption by Indian users

0.3 GB/user/month
2014

10 GB/user/month[2]
2018

25 GB/user/month[3]
2025E with an expected total data traffic of 21 EB/month

1 Statista.com
2 TRAI
3 Ericsson Mobility Report 2020

SECTION 1

India - The New Data Hub

Triggers of digital explosion

**Cheap data tariffs
(~94% drop in 6 years) [4]**

$ 12.0/GB
USA

$ 8.5/GB
Global average

$ 0.26/GB
India

India has cheapest data tariffs in the world (2019) [5]

Affordable smartphones and feature phones

₹ 12,000
Price of an average smartphone in 2008-09

₹ 1,400
Price of an average smartphone in 2018-19

Drop in average smartphone price (entry level) [6]

Demonetisation in 2016 triggered higher usage of cashless payments

100 Bn
Digital transactions in 2016-17

313 Bn
Digital transactions in 2018-19

**Rise in volume of digital transactions [7]**

Data localisation spurring data centre growth

The Government of India, over the past few years, has realised the potential of data and criticality of data protection. With the proposed rules for data localisation under the Personal Data Protection Bill, the steps to ensure data sovereignty has been initiated.

Under the proposed rules, data generated in India must be stored within India, protecting personal and financial data from foreign surveillance.

Select take-aways from this proposed bill:

- Data to be physically stored in India
- Cross-border transfer of critical data prohibited
- Cross-border transfer of other data encumbered – consents, saving copies locally, etc.
- Government of India could require sharing of anonymised data for policy making, or alike purpose
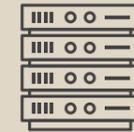
Data centre capacity per Mn internet users

<1 MW India

8 MW USA

21 MW Europe

ANAROCK Capital Research & Industry Estimates

With the data localisation rules coming in, existing data centre capacity will end up being highly constrained. Data localisation has laid the stone for development of hyperscale data centres in India to cater to this increasing data consumption demand.

India internet demographics (2019)

1,370 Mn
Total population

637 Mn
Internet users[2]

629 Mn
Active mobile internet users[2]

351 Mn
Active Social media users[2]

Annual growth over last 5 years

1%   **16%**   **12%**   **20%**

4 TRAI, World Economic Forum
5 World Economic Forum
6 Report by ICEA-KPMG on 'Contribution of Smartphones to Digital Governance in India'
7 Various Public Sources

2 TRAI

Data explosion + Data localisation = India, the new data hub in Asia

India is set to become a thriving data economy in the region. Below is a peek into the factors that will drive data centre demand in India:

Asia accounts for more than 50% of worldwide internet users[8]. Within Asia, India is one of the most populous countries (accounting for ~19% of world's population and ~31% of Asia's population).

Mobile penetration, even amongst rural population, is happening at a considerable pace.

Indians are the largest audiences of social media platforms Facebook and WhatsApp, 2nd largest of Instagram and LinkedIn and 3rd largest of Twitter[9].

The number of over-the-top (OTT) media service users in India is expected to cross 500 Mn in 2020, 2nd in the world after USA[10].

India is expected to be frontrunner in the Internet of Things (IoT) adoption in Asia Pacific. India is expected to have 1.9 Bn IoT devices by the end of 2020, as compared to 60 Mn in 2016 (137% annual growth)[11].

The Government of India plans to develop 100 smart cities and rejuvenate 500 others, leading to higher technology adoption by the states.
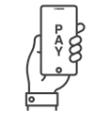
Mobile points of sale transactions are expected to rise from US$ 16 Bn in 2020 to US$ 44 Bn in 2024 (28% CAGR)[9].

Digital commerce is expected to rise from US$ 57 Bn in 2020 to US$ 94 Bn in 2024 (13% CAGR)[9].

End-user spending on cloud services in India is likely to touch US$ 3.4 Bn in 2020, a 25% increase over 2019[12]. The pandemic is accelerating this rate of cloud adoption further.

Sunil Gupta
Managing Partner & CEO
Yotta Infrastructure

Over the last decade, the epicentre of data explosion has shifted from enterprises to individuals like us, who are constantly on our smart phones, clicking images, posting on social media, accessing a multitude of apps available, caused by the enablement of technology. There is an enormous amount of data that needs high quality storage infrastructure. Data centre growth is inevitable to support this overlaying data growth.

8 Internet World Stats
9 statista.com
10 Ernst Young Study
11 FICCI – EY Report
12 Gartner Research

SECTION 2

Data Centre Industry

SECTION 2

Data Centre Industry

Historically, data centres in India have operated at a very small scale. About 126 third-party data centres are owned/operated amongst 53 players. Having said that, the capacity is highly concentrated amongst the top 12 players, who operate ~95% of the total IT Power capacity in the country.

Top 12 players

CtrlS — Asia's Largest Tier 4 Datacenter
cyfuture — Thinking Future, Moving Ahead
esds — enabling futurability
GPX Global Systems, Inc.
netmagic — An NTT Communications Company
NxtGen — Infinite Datacenter
nxtra data — SMART. SECURE. RELIABLE.
RELIANCE Communications
sify
STTelemedia Global Data Centres
Web Werks
YOTTA

Existing supply	Future supply
~126 3rd Party colocation & hyperscale data centres	**28+** Hyperscale data centres
7.5+ Mn sf[14] Total area	**16+ Mn sf** Total area
85,000 sf Average area/facility	**0.6 Mn sf** Average area/facility
590+ MW[14] Total IT power	**1,400+ MW** Total IT power
7 MW Average IT power/facility	**50 MW** Average IT power/facility

In addition, there is leveraged capital of over US$ 2.6 Bn waiting in the wings. These are ongoing discussions where investors are in process of firming up their India strategy, or scouting for local partners to kick-start deployment. This translates to another ~520 MW of potential data centre capacity that could be developed over the next 5 years.

$ 2.6+ Bn Leveraged capital

~520 MW Potential capacity (over the next 5 years)

14 Based on an analysis of 88 out of 126 colocation and hyperscale data centres

Demographic & type overview

Geographically, Mumbai has remained the most popular location for developing data centres. This is owing to the under-sea cable landings at Mumbai. Mumbai and Chennai, which have a fair share of existing and upcoming landing stations, will be the preferred locations for future supply.
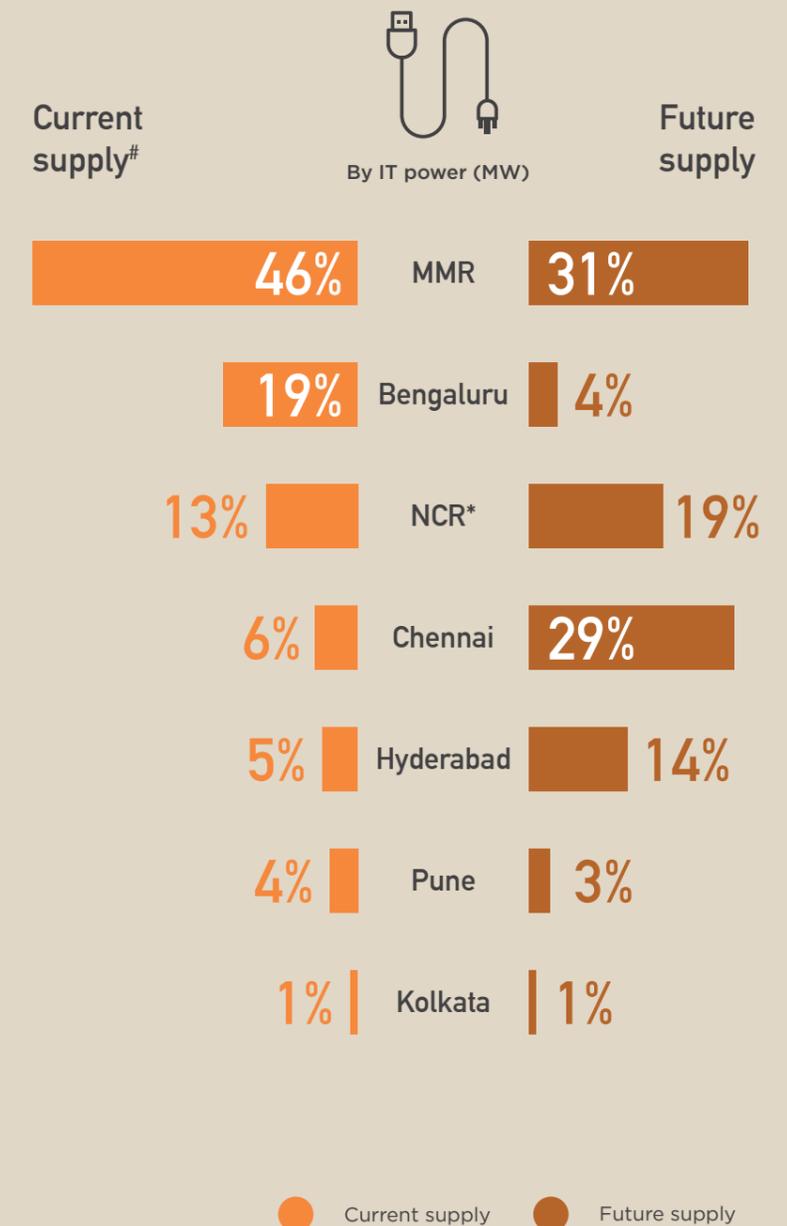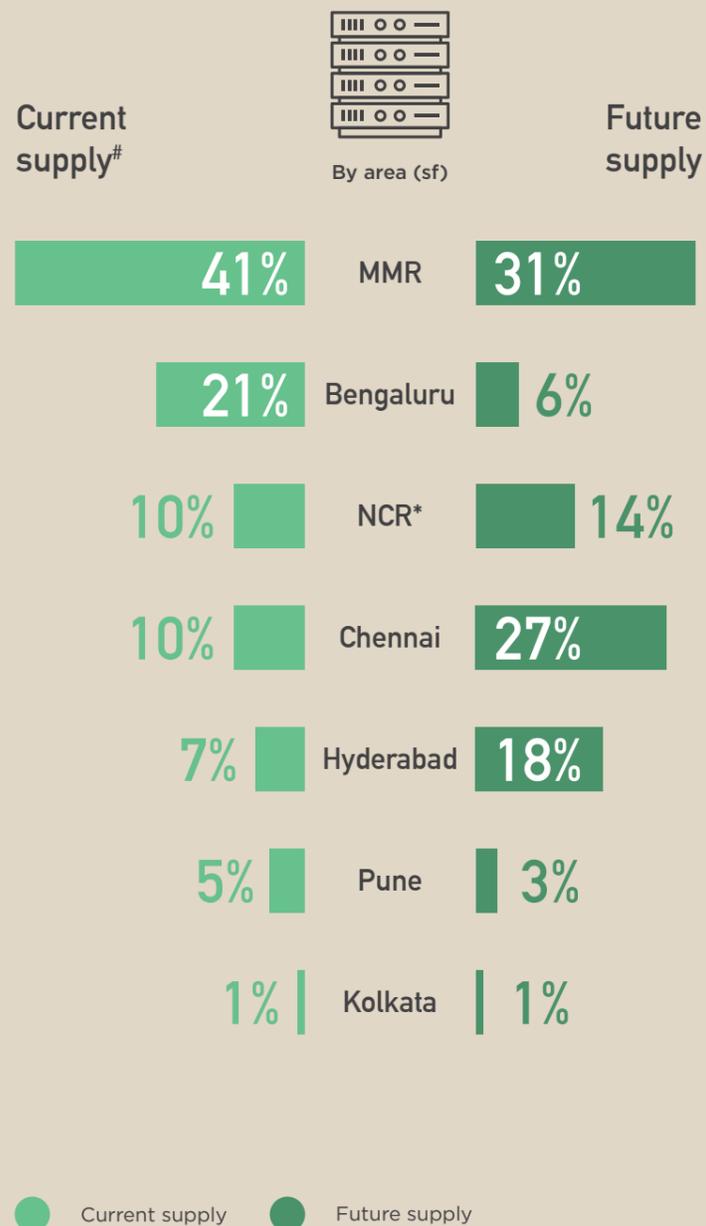
Data centre: Pan India

17 Under-sea cables	**29** Landing stations
Mumbai & Chennai Maximum concentration of landing points	

Current supply# — By area (sf) — Future supply

Current supply#	City	Future supply
41%	MMR	31%
21%	Bengaluru	6%
10%	NCR*	14%
10%	Chennai	27%
7%	Hyderabad	18%
5%	Pune	3%
1%	Kolkata	1%

● Current supply ● Future supply

Current supply# — By IT power (MW) — Future supply

Current supply#	City	Future supply
46%	MMR	31%
19%	Bengaluru	4%
13%	NCR*	19%
6%	Chennai	29%
5%	Hyderabad	14%
4%	Pune	3%
1%	Kolkata	1%

● Current supply ● Future supply
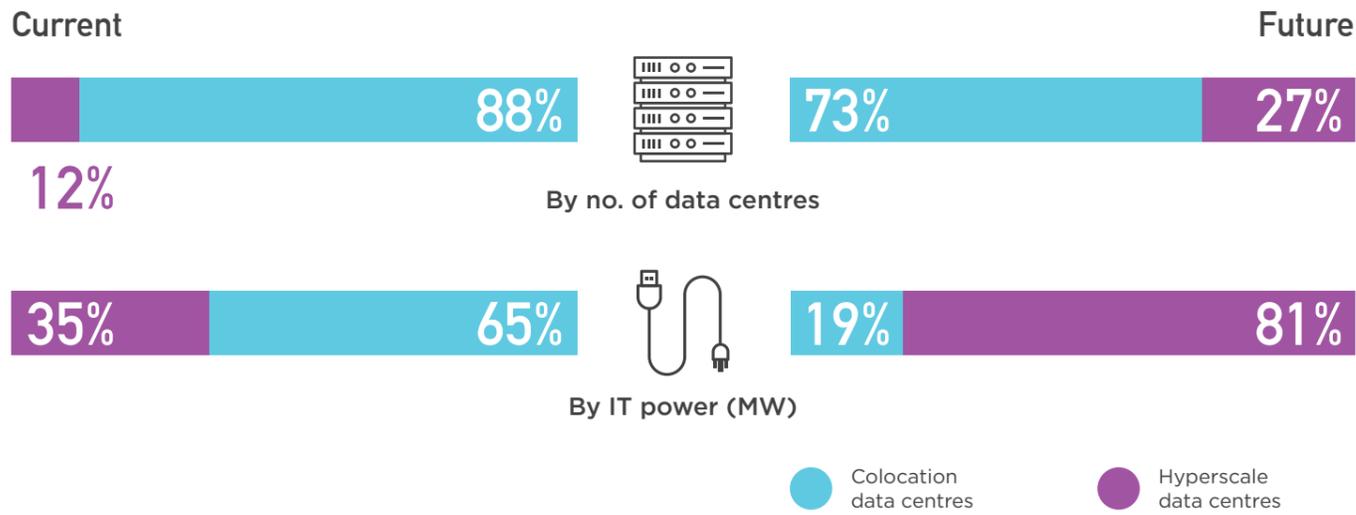
Map labels: NCR, Kolkata, MMR, Pune, Hyderabad, Bengaluru, Chennai

*Northern Capital Region (NCR) comprises of Delhi, Gurugram, Noida, Faridabad & Ghaziabad
Current Supply for Tier 2 cities: 5% of Area (sf) & 6% of IT Power (MW)
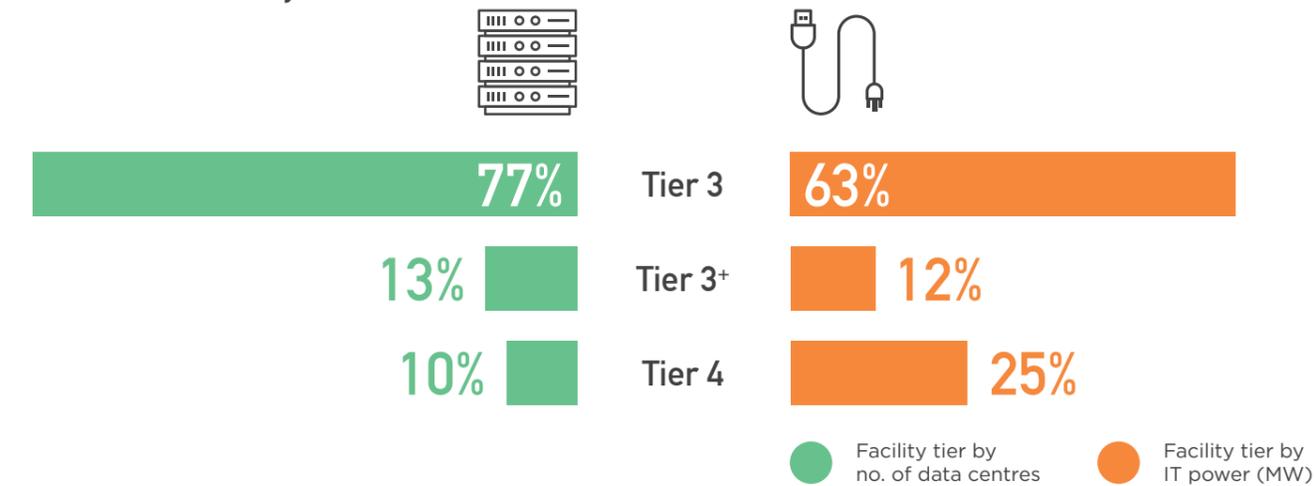
ANAROCK Capital Research & Industry Sources

With the new data localisation norms, India is moving towards creating hyperscale facilities over smaller colocation centres, to cater to the large domestic data warehousing demand. This also permits future scalability for hyperscalers. Smaller colocation facilities need to reassess their competitive position and may need to repurpose to ensure survival.

Data centre: Supply Pan India

Current   **Future**

88%	73% 27%
12%	

By no. of data centres

35% 65%	19% 81%

By IT power (MW)

● Colocation data centres   ● Hyperscale data centres

The majority of the facilities in India is Tier 3 with 99.982% guaranteed uptime availability, with around 25% of the capacity operating at Tier 4 with 99.995% availability. In order to ensure continuous infrastructure support and maximum uptime, most operators are now aiming to operate at a Tier 3+ level, that seeks to achieve
a balance between uptime availability with higher operating costs. Tier 3+ does not exist as a standard as defined by the Uptime Institute; it is indicative of a data centre having enhanced elements above Tier 3.
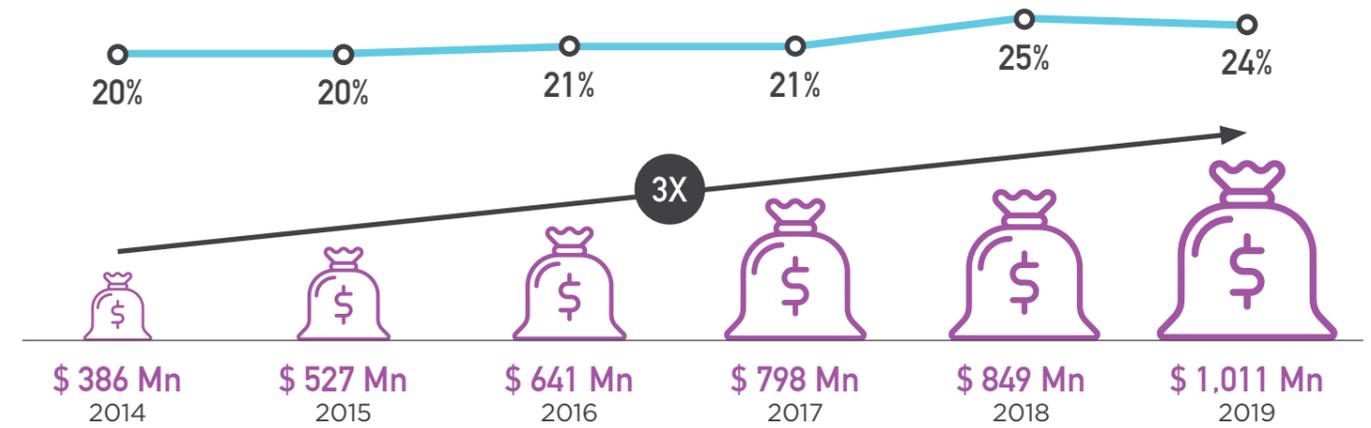
Data centre: Facility tier

	Tier	
77%	Tier 3	63%
13%	Tier 3+	12%
10%	Tier 4	25%

● Facility tier by no. of data centres   ● Facility tier by IT power (MW)

ANAROCK Capital Research

Financial overview

The total revenue[16] of the industry has grown by 3X[17] (20% p.a.) over the last 6 years.

With more hyperscale data centres being developed and cost efficiencies coming in, the EBIDTA margins have also consistently improved over the years.

Total revenue[16] of data centre industry

20%	20%	21%	21%	25%	24%

3X

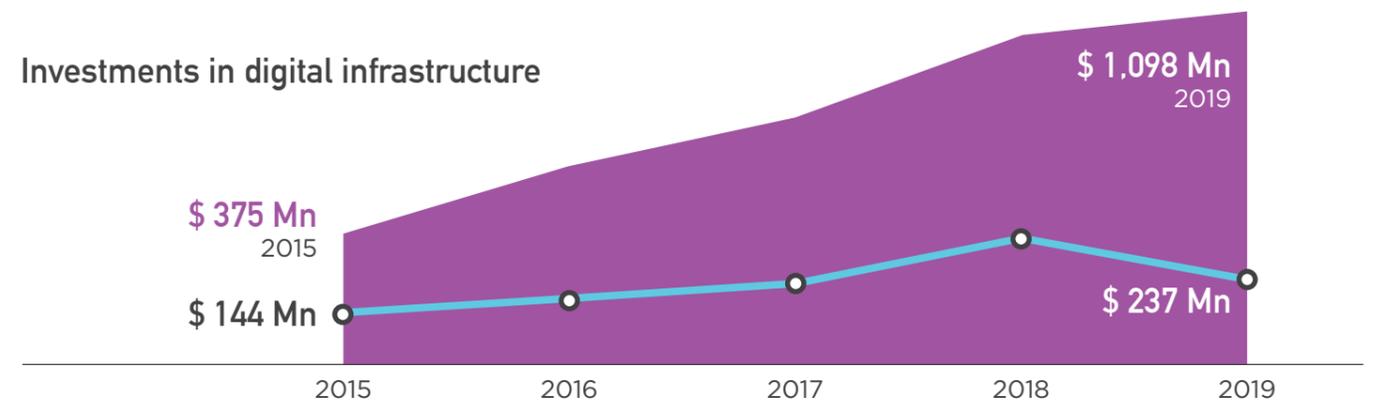| $ 386 Mn	$ 527 Mn	$ 641 Mn	$ 798 Mn	$ 849 Mn	$ 1,011 Mn
2014	2015	2016	2017	2018	2019

ANAROCK Capital Research; Exchange & MCA filings
Average US$/₹ exchange rates for each year

● Total revenue (US$ Mn)   ○ EBITDA (%)

The investments into creating physical infrastructure for data storage has been on the rise. In the last decade, the net fixed assets have increased 25% p.a. from US$ 115 Mn in 2010 to US$ 1.1 Bn in 2019.

Investments in digital infrastructure

$ 1,098 Mn
2019

$ 375 Mn
2015

$ 144 Mn

$ 237 Mn

2015	2016	2017	2018	2019

ANAROCK Capital Research; Exchange & MCA filings
Average US$/₹ exchange rates for each year

● Net fixed assets as of year-end (US$ Mn)   ○ Cash invested in business through the year (US$ Mn)

Based on the future potential supply expected and new investments anticipated, the gross investments in fixed asset could increase by ~US$ 9.5 Bn in the next 5 years.

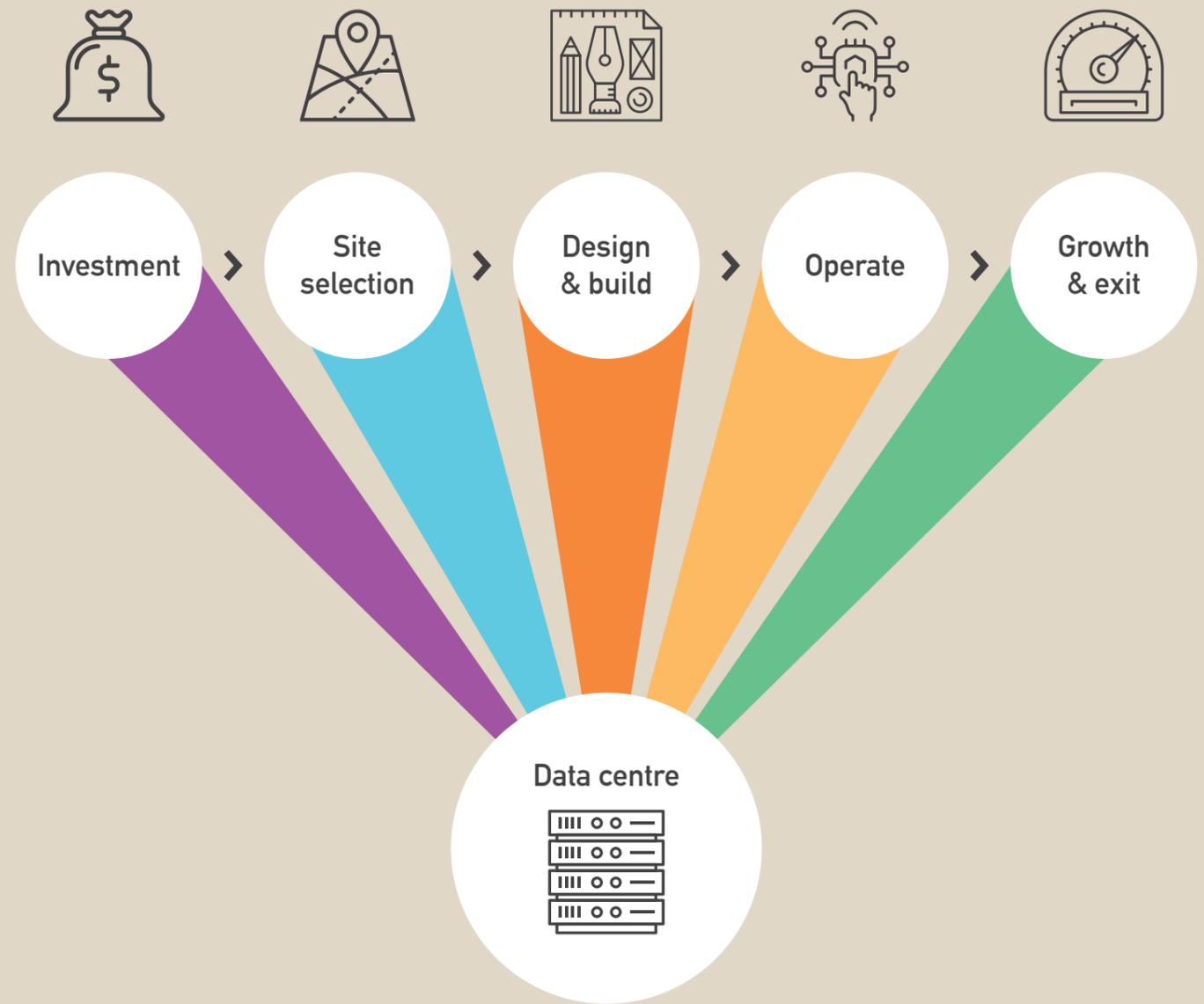16 Total revenue includes cloud & other managed services
17 Based on the analysis of the top 12 data centre operators (comprising 95% of the total IT power capacity); Multiple in ₹ terms

SECTION 3

Data Centre Lifecycle

Investment > Site selection > Design & build > Operate > Growth & exit

Data centre

Investing – The capital perspective

India has witnessed close to US$ 977 Mn of investments in the data centre industry since 2008, a mix of private equity and strategic investments. Of this, US$ 396 Mn has been infused in 2020 (until Sep 2020).

We are currently witnessing a couple of emerging trends on the capital side:

Data centre - A new alternative real estate asset

Data centres until now were considered an operating business. With the focus shifting to large hyperscale developments, the underlying property is becoming more valuable. Large commercial or industrial developers, having access to land parcels and expertise in local liaisons, have jumped into the bandwagon, to look for alternative uses of their assets. Large sovereign and pension funds, who prefer investing in yield assets, are evaluating data centres as a potential yield investment. This new interest in the sector, is causing segregation of property income from operating income, to create two distinct income streams to meet different capital preferences.

Data centres have interest from yield as well as growth investors, leading to a liquidity tap that could catapult data centres into the next level. Approximately US$ 9.5 Bn of leveraged capital is in various stages of being announced, committed or waiting to be committed into data centres in India.
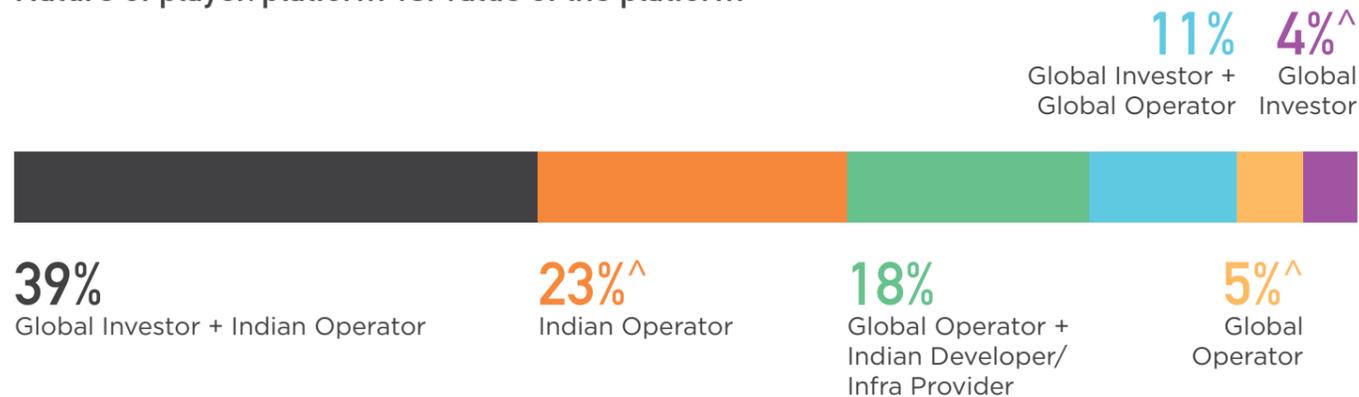
Platforms with a selected operator

Large global investors are now looking at creating a platform with a selected operator for investment into and development of data centres.

There is a limited universe of domestic data centre operators who match up to the criteria evaluated by large funds, on tenure and scale of operational experience. Such operators have the potential to grow large with adequate capital backing. In addition, large global operators are viewing India favourably and looking to set up shop domestically.

Nature of player/platform vs. value of the platform

| 39% | 23%^ | 18% | 11% | 5%^ | 4%^ |
| Global Investor + Indian Operator | Indian Operator | Global Operator + Indian Developer/ Infra Provider | Global Investor + Global Operator | Global Operator | Global Investor |

^ No specific investor or operator tie-up yet   ANAROCK Capital Research & Industry Sources

---

Investment ❯ Site selection ❯ Design & build ❯ Operate ❯ Growth & exit

Choosing the India partner

Large institutional players, private equity funds and global operators are evaluating certain niches while choosing their Indian partners.

Key criteria of choosing a platform partner for investors/operators are given below:

Criteria for choosing an operating partner

- Operating track record
- Access to and relationships with hyperscalers
- Ability to source clean energy
- Ability to source power and fibre networks through liaison with public sector

Criteria for choosing a local partner

- Power supply or distribution capabilities
- Ability to source clean energy
- Telecom business adding leverage on fibre availability and access to existing mobility market
- Ownership of under-sea cables
- Ability to provide inter-connected services to multiple cloud providers and hyperscalers
- Real estate development track record and local liaison expertise

As many large players are evaluating this sector currently, the key factor remains in identifying one's differentiator and creating value around such differentiators.

Investment → **Site selection** → **Design & build** → **Operate** → **Growth & exit**

Summary of investment phase

US$ 977 Mn of investments in data centres in India, US$ 396 Mn until Sep 2020

Two emerging capital trends:

Change in perception as an alternative real estate asset providing yield income to large infrastructure investors

Creation of large platforms between operators on one hand and investors / developers on the other hand – several global operators and investors committing capital to the sector

~US$ 9.5 Bn of capital is in various stages of being announced, committed or waiting to be committed into data centres in India – majority in partnership with a local India partner (either data centre operator / developer / infrastructure provider)

With the level of competition stepping up, key to success will be identifying one's niche and creating value around such a differentiator. Some of the notable differentiators include global hyperscaler relationships, infrastructure capabilities (power/telecom), local liaison expertise, inter-connect services, etc.

Rajesh Tapadia
CEO
Nxtra Data Ltd.

The way data centres are getting designed is completely different now. It is much more optimised in terms of efficiencies and usage of square feet. All benefits are passed on to the customer. There is a lot of automation taking place, in terms of monitoring management, analytics and building management systems, where huge amounts of innovation has come up. This is helping customers to be more confident in taking up spaces.

Choosing the right location & site

Investment > Site selection > Design & build > Operate > Growth & exit

There are certain primary factors that play into location and site selection decisions.

Under-sea cables

There are 17 under-sea cables with 29 landing stations across India. Mumbai and Chennai have maximum concentration of such landing points. The cables connect Mumbai and Chennai to various strategic cities in South & South East Asia, Middle East, Africa and Europe. These two cities remain the favourites for most operators to locate their initial data centres, given the higher cost of pulling the cable inland.

Proximity to customers

A fast-track adoption of edge computing, which means bringing data storage closer to the location of the user, is emerging on the back of COVID-19 crisis. Additionally, India is on the roadmap for 5G implementation. Edge data centres will become necessary post 5G rollout to limit latencies.

Most operators plan to have facilities in all major metro cities, from a client retention perspective, as hyperscalers seek to partner with a single vendor for multiple cities.

Tier 1 vs Tier 2 cities

While Mumbai and Chennai remain the foremost choices, the other metro cities of Hyderabad, NCR and Bangalore are also of interest given the huge catchment of urban population and large enterprises.

Hyperscale data centres will still manage the brunt work of the cloud. But in India, where the data requirements of Tier 2 cities are on the rise because of a decentralised workforce, there will be an increased demand for rapidly deployable smaller colocation data centres built closer to smaller cities.

Such facilities will see rack demand on a much smaller scale and therefore, will be multi-tenanted. In the absence of a large anchor customer, operators looking at smaller cities need to balance out their customer requirements with the capex involved in building out a speculative facility.

Government policies & incentives

State governments of Maharashtra, Gujarat, Telangana, Uttar Pradesh and Haryana are providing fiscal and other benefits for setting up data parks. Benefits range from providing subsidies on land, power, or other infrastructure, tax or duty waivers, grant of infrastructure/industry status, classification as essential service, etc.

The Central Government has also issued a draft policy on data centres with the vision to boost investment into the sector and make India a global data centre hub.

The fiscal and non-fiscal incentives brought out by different states under this policy will also be instrumental in determining demand.
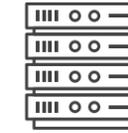
Infrastructure availability

Within a city, demand is highly driven by whether a particular location is sellable and acceptable to the customers. The basic infrastructure of power and fibre availability is non-negotiable while choosing the sites.

Faster deployment opportunity

Go-to-market is most critical today, and whoever can make supply available sooner stands to win clients. This consideration plays a key role and ready or under construction properties that have specs that are either suitable or can be easily retrofitted for a data centre, will be prioritised.

Investment > **Site selection** > Design & build > Operate > Growth & exit

Summary of site selection phase

Presence of under-sea cables: Mumbai and Chennai to become the data centre hubs within India

Need for proximity to customers: Tier 1 cities, in general, will see a fair share of developments, especially in light of expected 5G rollout

Data consumption in smaller cities: Tier 2 cities will see demand for smaller colocation facilities given the growing data consumption of other urban cities

Incentives: Draft national policy on data centres proposed to give infrastructure status and other fiscal and non-fiscal benefits to the industry

Power and fibre connectivity: Uninterrupted power supply and fibre connectivity are key factors that drive site selection

Faster go-to-market: Opportunities that allow faster deployment will see increased interest from the industry
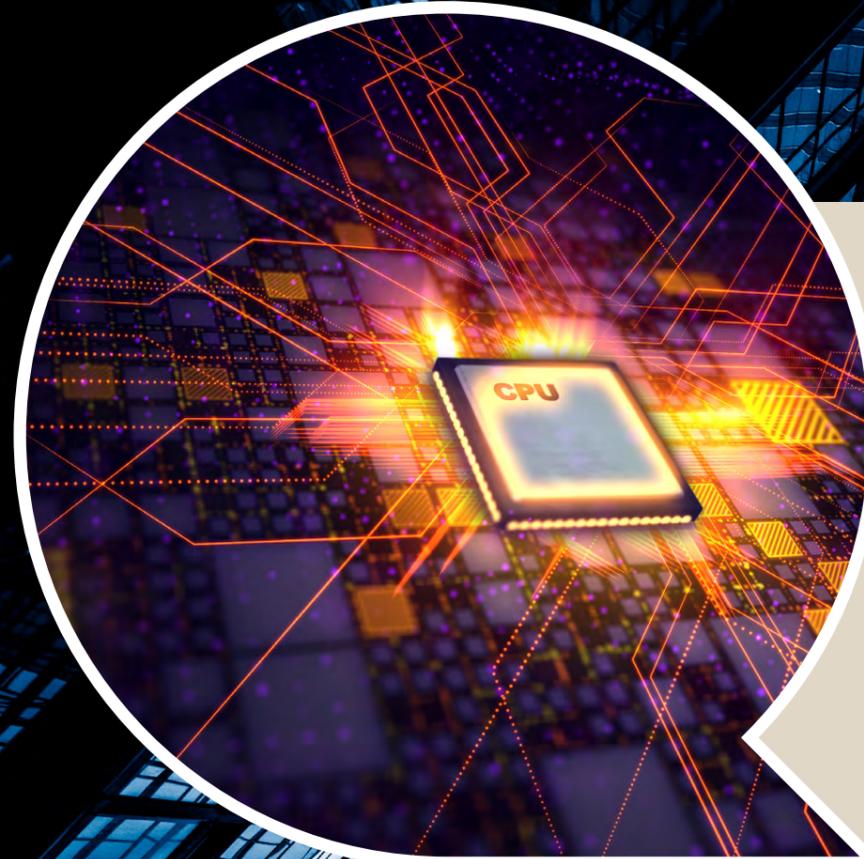
Piyush Somani
Founder, CMD & CEO
ESDS Software Solution

Data consumption in India has witnessed an upsurge over the last two years. Storage consumed per machine and CPU/RAM used per application and database have spiked 7-8x in the last four years. This projects humongous growth in compute and storage consumption as well. Our resource estimations for the current year have been surpassed in the lockdown, with an increasing order book for storage spaces, being delivered at a high pace. We have multiplied our optimal internet bandwidth 30x in the lockdown. Data consumption is growing unpredictably and 'petabyte' should be the new normal pretty soon, replacing megabyte, gigabyte and terabyte for data measurement. With such data consumption patterns, we expect an enormous growth in the coming years.

Design & build optimally

There are certain primary factors that play into location and site selection decisions.

| Investment | > | Site selection | > | Design & build | > | Operate | > | Growth & exit |

Land acquisition & approvals

Until now, operators have been buying or leasing land directly and building everything on their own. In the process, they engage with best-in-class designers, work on design blueprint including master planning of the campus and then engage with a general contractor to execute it as a turnkey project.

If land is bought from the Government, the entire cycle for acquisition, approvals and compliances could take longer. The industry has been making several representations to highlight some of these issues to the Government, to fast-track land allocation and simplify approvals.

Considering the pressure for faster go-to-market, operators are now looking at a change in strategy, exploring build-to-suit models on the civil side. Operators are looking to partner with developers to construct the building to their specifications and deliver within defined timeframe. However, design and Mechanical, Electrical and Plumbing (MEP) will be controlled by the operators end to end.

Building methods

Environmental factors influence the building method. In India, data centres are built on the base of concrete structures, whereas European and North American data centres are built out of steel and cladding.

Highly resilient infrastructure starts with highly resilient power, which ideally should be supplied from two independent energy sources.

Electrical and mechanical energy sources need to be designed to maintain the resilient levels that align with the Uptime Institute's building ratings. All power sources must be tested and commissioned.

Modularised development

Innovation and Design for Safety, Manufacturing and Assembly (DfSMA) are challenging the way that buildings are designed and constructed to deliver faster and to higher levels of quality. The inherent qualities of data centres make them exceptional environments to test and deliver faster and more modern method of construction.

Benefits
- Greater safety due to modular approach
- Reduced risks in working at height
- More efficient working on site
- Higher quality
- Reduced timelines
- Increased commercial savings

Modularisation within a data centre can take many forms ranging from unitised components and assemblies such as Hot Aisle Containment and multi-service MEP modules through to volumetric prefabricated electrical and data suite modules. In all cases the modularisation approach should increase offsite manufacturing and pre-commissioning and therefore benefit the projects by increasing safety, and reducing schedules, risk of delay and the environmental impact of construction.

Operators are now open to exploring construction methodologies that minimise development timelines, even if the development cost increases by about 10-15%. In India where the majority of data centres are currently developed as vertical build, there is merit in considering modern methods of construction and modularisation.
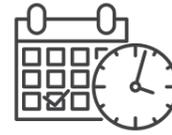
Development timeframes

A range of options in terms of size and scale are available to data centre operators, who are making quick decisions about what to build to meet the increasing demand.

Typical construction timelines

±**18-30** months
Hyperscale data centre

±**12-18** months
Colocation data centre

± **6-9** months
Rapid Data Centre (RDC)

Rapid Data Centre (RDC)

In developed economies such as Europe, there is an increasing trend towards Rapid Data Centre (RDC) to allow operators fast and efficient start up in new locations and EDGE sites. In a similar pattern that could be expected in India, residents in Tier 2 & Tier 3 cities will require and consume more and more data, which is driving the need for data centre facilities that can be rapidly developed. Generally, RDCs are single or two storey facilities which could be followed by a hyperscale project.

RDCs minimise construction to save time and increase quality. Using modern methods of construction, the data centre becomes more of an assembly point than a construction site. Sets of premanufactured components can be built and tested offsite and shipped together in pods, which are dropped into place. Once onsite the components can be assembled rapidly using easily available tools. Pre-construction phase is ~9 months. From drilling in the ground to handing over the keys to an RDC, the timeline is 6-9 months with capacity range of 4-8 MW.

Building Information Management (BIM)

A digital platform brings the various development components together. Using BIM initiatives across the entire scope of a data centre project delivery, can improve accuracy and efficiency. BIM on site enables greater team communication and collaboration.

It sets out the rules early in the project phase, concentrating on **two key goals:**

Model Management, with emphasis on tying into the design review process and construction programme to achieve a totally clash resolved and perfect digital prototype of the facility.

Field management, with emphasis on using the data collected in the field, to improve management of quality standards and achieve aggressive project milestones.

The adoption of lean, 'real-time' digital workflows in construction management leads to significant cost savings across the entire project lifecycle through increasing productivity and eliminating costly re-work.

Thanks to the digital replica/twin of the building that can be created through BIM, there is a common thread of data throughout the project lifecycle from design through to operations.

Factors for success in project delivery

Transparency

A project controls system that brings all the live information about the construction progress on a single platform.

Effective procurement

To ensure a fast, simple and collaborative procurement process, contracts should be aligned to the scope of work. Key project objectives and priorities must be understood, and constraints assessed, from the outset. This engages the supply chain in a way that keeps programme disruptions to a minimum.

Rigour & process

Best practice around the introduction of digital tools and IT infrastructure will enable clear processes and rules to be followed.

Health & safety

International best practice should be introduced in a health and safety implementation plan that addresses local challenges.

BIM implementation

Using BIM initiatives across the entire scope of a data centre project delivery can improve accuracy and efficiency.

Testing & commissioning

Critical aspect of the data centre build. All power and cooling system trees must be fully tested and commissioned to confirm the resiliency and reliability of the data centre.

Investment > **Site selection** > **Design & build** > **Operate** > **Growth & exit**

Developers/Operators are increasingly looking at **built-to-suit opportunities** that allow operators to partner with developers for civil side of construction, while controlling design and MEP.

Modularised developments using prefabricated structures, which are popular in the developed economies such as Europe, could provide a huge advantage in developing high quality builds within efficient timelines. RDC could specifically benefit from such modularised developments

Typical development timelines for data centres:

Hyperscale: +/- 18 to 30 months
Colocation: +/- 12 to 18 months
RDC: +/- 6 to 9 months

Using BIM can bring various components in the development phase together to improve accurate and efficient project delivery

Summary of design & build phase

Operate efficiently

Regardless of the type of data centre, the operations phase is approximately similar. Key considerations are 1) levels of resilience found within the redundant infrastructure, 2) the level of automation found in control systems, 3) consideration relating to location and the indigenous environment, which determines plant selection and configuration.

Data centres are measured in two ways – on power consumed and data stored / processed.
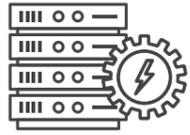
Core data centre infrastructure

The core infrastructure of a data centre includes data, power and cooling.

Data

Millions of computers, known as servers, serve the cloud. Servers do all the calculations and control how data is distributed and stored. Silicon chips inside the servers produce a lot of heat and require a significant amount of power and cooling.

Servers sit in racks. Once the data centre hall is built, it is populated with racks of up to 8 tonnes in weight and 2.2m in height. Optimising the load, floors and racks is a key aspect of the build. A typical data hall might hold 15,000–20,000 servers on 800-1,000 racks and produce and need 7-10 MW of power.

A typical data centre may have a number of halls and produce 30-40 MW of heat, sufficient to power more than 12,000 homes. In a campus environment you might have six of these buildings, 200+ MW of power.

Cooling

Cooling the data centre can equate to as much as 40% of the facility's energy bill. Hence, making improvements in the cooling systems, can make this the biggest area for cost savings. Hot Aisle Containment (HAC) and Cold Aisle Containment (CAC) is a highly effective process of airflow management within data centres, which results in the optimisation of cold air usage and rack/server performance.

Power

Power resilience and redundancy is key for data centres. Due to the large amount of energy required to power, cool and back up the data centre, the availability of renewable resources is driving the choice of location for data centre developers.

Power resilience is a critical requirement for all data centres and typically this has been provided in the past by diesel backup generators that operate in case of an outage of the mains. This is expensive and has a significant environmental impact. Most operators and hyperscalers are keen to move to a future state that relies less on the combustion engine and where renewable sources of energy such as solar, wind, natural gas or hydroelectric plants provide both the normal and standby power protection. Even a partial replacement of diesel back-ups with cleaner sources can result in substantial carbon savings. On the back of a highly conducive policy environment, a steady influx of capital, falling prices and new technologies, India has seen an exponential growth in its renewable energy sector in the past five years.

| Investment | > | Site selection | > | Design & build | > | Operate | > | Growth & exit |

Today, with an installed renewables capacity of 84 GW, plus 36 GW under development and a further 30 GW out for tender, India is among the top-five clean-energy producers globally and is well on course to surpass its original target. In fact, India is now eyeing 175 GW from renewables by 2022 and a target of 40% clean energy by 2030[17].

India is the 4th and 5th largest producer of wind and solar energy, respectively in the world. India is ahead of many of its Asia Pacific peers including Indonesia, Republic of Korea and Australia on production of clean energy. India's high global standing as a renewable energy producer makes it an attractive region for the data centre industry.

17 Ministry of New & Renewable Energy

AI & data analytics

Artificial intelligence (AI) and IoT are becoming increasingly important tools in the data centre operations stage. AI can use data from smart sensors to analyse energy efficiency, track power levels and monitor server performance – all in the name of ensuring critical uptime and increasing performance levels.

Investment > **Site selection** > **Design & build** > **Operate** > **Growth & exit**

Summary of operation phase

Ensuring system and asset uptime in the critical engineering aspects of data centre operations, including electrical distribution infrastructure, power generation, fuel supply, uninterruptible power Source (UPS) and critical cooling systems.

Undertaking design review to understand potential weaknesses in system configurations [a single point of failure (SPOF) analysis] to ensure control protocols are appropriate for maintenance, activities and recovery scenarios.

Maintaining the building fabric viz. keeping out adverse weather and robust drainage systems

Ensuring compliant systems with local statutory regulation and building codes

Optimising cooling systems for controlling energy consumption and maintaining efficiencies. This can be achieved with smart sensor technology and control systems. The set-up of hot and cold aisle containment improves the efficiency of cooling systems. In a country like India, air conditioning systems must be designed for close control to handle humidity.

Ensuring cleanliness of technical areas to require regimes for air particle testing, floor polishing, high level cleaning, racks, gantries and under raised floors.

Logistics, equipment transfers and traffic flow lifting technology within the building to get equipment into the racks and around the data centre

All stakeholders in a data centre's ecosystem must collaborate closely from the design phase to ensure that the facility is operating as energy efficiently as possible.

Mapping power tariffs & subsidies

In India the majority of data centres are located in the states of Maharashtra, Karnataka, Tamil Nadu, Telangana, Uttar Pradesh and New Delhi.

MAHARASHTRA

In most states, data centres are considered as part of the IT/ITeS infrastructure, but only in Maharashtra, they are specifically identified separately. IT/ITES units registered with the Directorate of Industries, are supplied power at industrial rates applicable under Maharashtra Electricity Regulatory Commission's (MERC's) tariff orders. New IT/ITES units located in areas that are not industrially developed[18] and established in registered IT Park are eligible to get power tariff subsidy for 3 years at ₹ 1 per unit.

UTTAR PRADESH

In Uttar Pradesh, MSME IT/ITes units are eligible for 25% subsidy on power bills for a period of 3 years from the date of commencement of commercial operations or ₹ 30 lakhs whichever is earlier.

KARNATAKA

100% exemption of electricity duty is provided for an initial period of 3-5 years, depending on Zone where data centre is located.

TAMIL NADU

New or expanding manufacturing units are given electricity tax exemption on power purchased from Tamil Nadu Generation and Distribution Corporation Ltd. (TANGEDCO) based on the level of investment.

Average cost per unit in the given Indian states varies from ₹ 6.35 – ₹ 9.45 per unit

NEW DELHI

TELANGANA
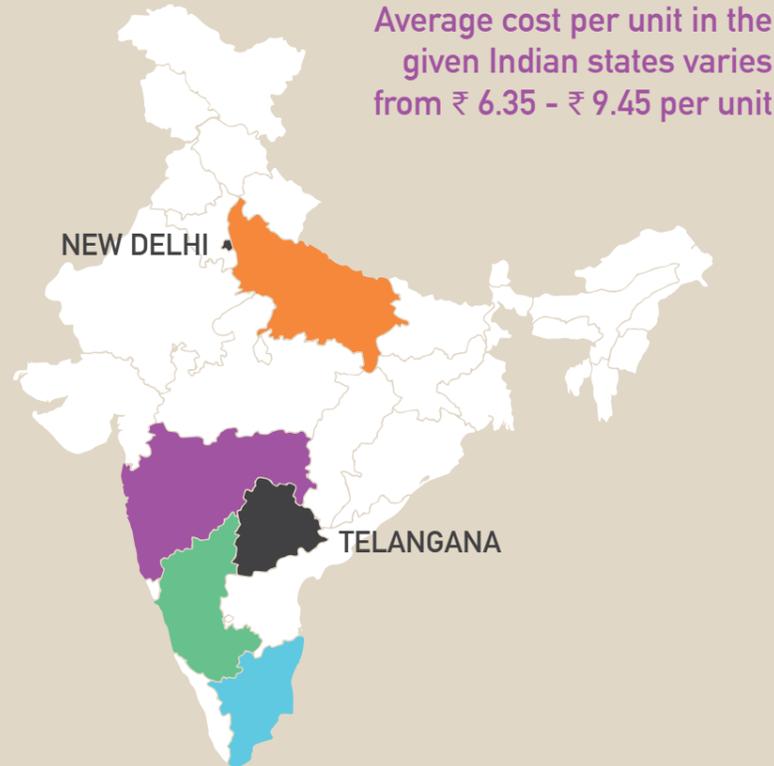
Investments in fixed assets (₹ Cr)	Direct Employment (#)	Capital Subsidy (₹ Cr)	Electricity Tax Exemption (years)
5-50	500	0.3	2 years
50 - 100	500 – 1,000	0.6	3 years
100 - 200	1,000 – 2,000	1	4 years
200 - 500	2,000 - 4,000	1.5	5 years

Along with Power Tariff Subsidy, State governments also provide Stamp Duty Exemption, Capital Subsidy and VAT refund to attract more players in setting up the data centre.

18 Other than industrially developed areas classified as Groups A & B under the Package Scheme of Incentives

MeitY's draft data centre policy 2020

Keeping in mind the need to establish a national framework, the Ministry of Electronics and Information Technology (MeitY) has in November 2020, issued a draft policy for intervention / promotion of data centres in India.

Some of the key proposals

Ease of Doing Business (EoDB)

Infrastructure status to the sector

Single-window clearance and simplify operational approvals along with defining timelines

Pre-provisioned data centre parks with internal infrastructure for **'plug & play' model** for operators

Fiscal & non-fiscal incentives (to be defined later by Centre & States)

Incentives for local manufacturing and procurement of IT & non-IT equipment

Favourable ecosystem

Uninterrupted & cost effective **power supply**

Robust and cost-effective **connectivity backhaul**

Encourage Joint Ventures (JV) & foreign investments

Skill development & entrepreneurship initiatives

Data centres to be classified as essential service

Promotion of R&D to facilitate their commercialisation & sustainable growth

Setting up of facilitation cell/unit

Separate category under National Building Code

Publish & maintain minimum standards

Setting up of an independent Data Centre Industry Council

The Government of India is proposing to set up at least four Data Centre Economic Zones (DCEZ) with most conducive non-IT and IT infrastructure, power and regulatory environment. The Government is also intending to promote indigenous manufacturing of equipment and products to reduce the overall costs of the industry.

The draft policy will give plenty of confidence to the global operators and investors who are favourably looking at India, however are challenged by the complex local environment. The step is in the right direction and should provide an overarching framework to the proposed data localisation policy of the government. The policy's effectiveness will also depend on the nature of fiscal and non-fiscal incentives announced by the Central and State governments under the policy and their effective implementation.

Growth potential & exit

Assuming a 15x[19] EBIDTA multiple, the enterprise value of data centre industry could rise from current levels of US$ 3.6 Bn to close to US$ 19 Bn[20] in 5-7 years from now.

Investment > Site selection > Design & build > Operate > Growth & exit

Risks of growth

Being a technology heavy industry, investors and operators need to be cognizant of certain risks, to avoid redundancies.

For example, obsolescence risk of technology is one of the biggest challenges where servers need to be updated on a regular basis. There is constant experimentation on technology for storing data, including such as the underwater data storage capsule recently experimented by a large technology company.

With the increasing volumes of data getting generated, one also needs to factor technology that allows significant data compression that can allow higher data storage in limited space.

Technology is advancing to ensure more computing and power capabilities per square feet and therefore, data centres needs to constantly evolve to stay technologically relevant.

Data Centres need to be cutting edge on technology, as well as ensure increased automation and data analytics. Smaller existing colocation players could potentially lose their market if they do not ensure a competitive cost advantage to their services.

13%-14%
Development yield sought by core investors (post tax)

8%-8.5%
Core trade yield sought by core investors

18%-22%
Returns sought by core & growth investors (post tax)

Exit strategy

The data centre industry is at an inflection point of growth. Similar to infrastructure investments, majority of capital expected to be invested in data centres will be patient capital with longer time horizons of 7-10 years.

Private equity investors are looking at entity level investments with the objective of listing the company on public markets in 5-6 years. In comparison, infrastructure investors could evaluate the option of listing the underlying assets as a REIT, creating perpetual yield income. One of the primary advantages of a data centre is that leases have extremely long tenures, typically a minimum of 10 years and going up to 30 years. The disproportionate amount of capex that goes into setting up a data centre (MEP and IT equipment could be more than 10x the civil cost), justifies longer lease tenures. This leads to a better valuation than a typical commercial or infra asset.

Unlike a typical property investment, data centres have the additional possibility of being bought out by the hyperscalers occupying them, while retaining the operating manager for a fee. The owner and operator distinction will become more pronounced over the years.

Data centre industry lifecycle[20]
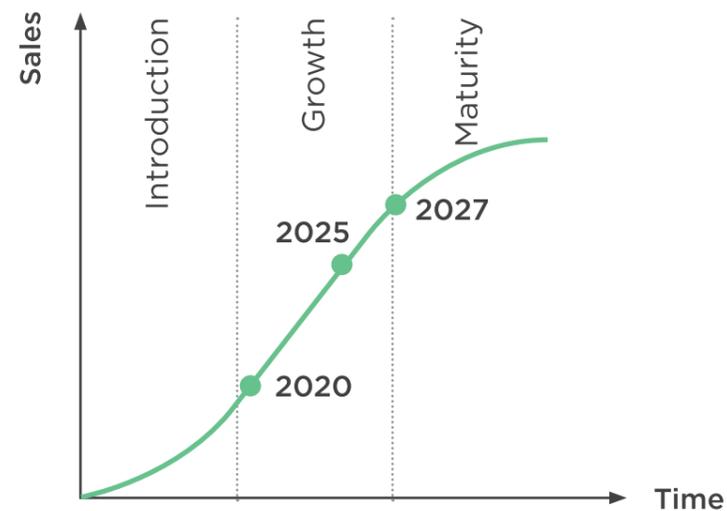
Investment 〉 Site selection 〉 Design & build 〉 Operate 〉 Growth & exit

Summary of growth & exit phase

The Indian data centre industry is expected to grow from US$ 3.6 Bn currently to US$ 19 Bn in 5-7 years

Investors typically look at 13-14% post tax development yields and 8-8.5% core yields

Technology obsolescence risk is one of the key risks to growth to be considered by the data centre industry

India is currently on the growth phase of its lifecycle and could enter the matured phase in 2027 or later. One should expect more democratisation of the industry through IPOs and REITs in this phase
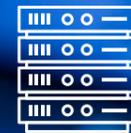
The Indian data centre industry is expected to grow from US$ 3.6 Bn currently to US$ 19 Bn in 5-7 years

SECTION 4

The Wave Ahead

It is helpful to summarise the analysis within a SCOT framework, as we now look to step into the next wave of growth of data centres in India.

Strengths

Huge demographic advantage due to a large population base, 67% of the population between the ages 15–64 (active consumers of data)

Data localisation puts a legal onus on operators to store data locally

Presence of a **large affordable workforce** pool

Challenges

Headway to be made vis-à-vis fiscal and regulatory support at the national level to **recognise this industry as a priority sector**

Local approvals & liaisons can be time-consuming and complex

Higher development costs due to vertical developments (given preference to be closer to data density)

Opportunities

Huge scope for mobile penetration to smaller cities as well as rural areas

Prefabricated modularised developments can allow faster go-to-market

Availability of **large pools of patient capital**

Availability of renewable sources of power can facilitate sustainability

Threats

**Power outage possibilities** could dampen prospects of India becoming a regional data hub

Technology obsolescence could increase frequency of capex

**Partner risk** given limited established local partner options for global players

Digital infrastructure is critical to the growth of India as a formidable economy in Asia. Unless data centre capacities are ramped up substantially and quickly, there could be severe loss of data for individuals and business. This could have consequences
for the economy and could end up being a lost opportunity for India.

As a part of Digital India programme, the Government of India intends to make digital infrastructure a core utility for its citizens at par with power, gas, etc. It is critical to ensure high speed internet availability to the citizens given the rapid pace of mobile penetration. The Central Government should step in and implement necessary actions, to ensure that the challenges and potential threats are adequately addressed, and business confidence is boosted.

The economy is changing in ways never imagined by humankind before. And the pace is unprecedented. The pandemic has indeed been a tipping point in global geo-politics and India stands to gain in the shifting world order. With the right Government impetus, incentive and support, we believe that its vision to make India a regional data hub is on track.
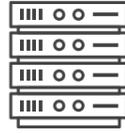
Data centres, in its true sense, are essential services that keep the larger economy sustaining and growing. The segment presents an enormous opportunity for global players to deploy resources and ride the growth wave, as India is set to become a major data hub within Asia pacific in the next decade.
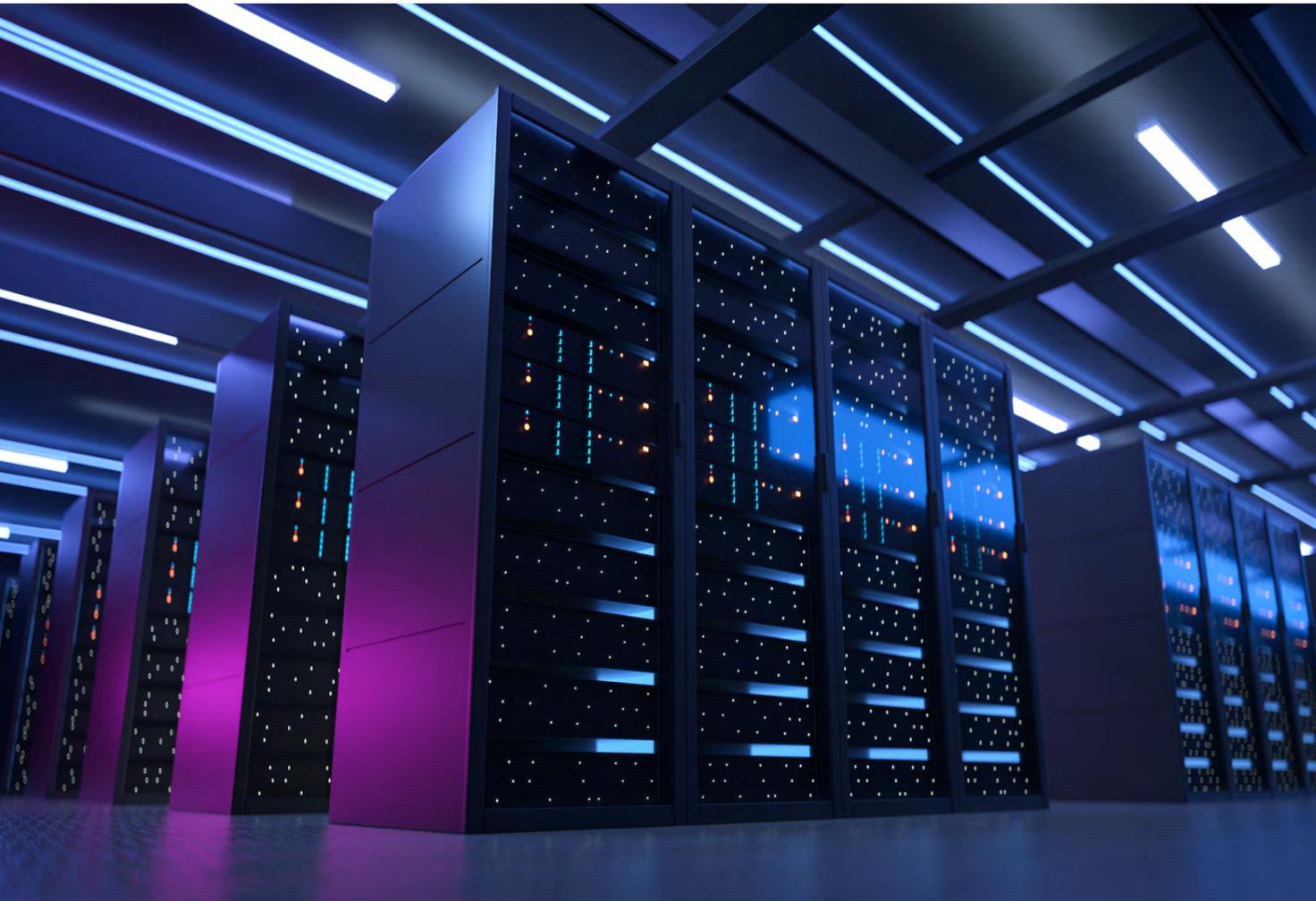
Some Terms Explained

Zetabyte (ZB) | Exabyte (EB)

1 Zetabyte (ZB) = 1,000 Exabyte (EB) = 1 Tn Gigabyte (GB)

Colocation data centre

Shared facilities where the infrastructure is used by different companies. A company of any size can rent a rack in a server room and they pay for the data to be stored.

Hyperscale data centre

Large data centre facilities generally owned / operated by the company it supports. Practically, hyperscale data centres could also be partially used to colocate multiple clients. Hyperscale data centres tend to have more than 5,000 cabinets and span over 100,000 sf.

Building Information Modelling (BIM)

An intelligent 3D model-based process that gives architecture, engineering, and construction professionals the insight and tools to more efficiently plan, design, construct, and manage buildings and infrastructure. A highly collaborative process, it can also span into the operation and management of buildings, as the data allows owners and stakeholders to make decisions based on information derived from the model after its construction.

Hot Aisle Containment (HAC) & Cold Aisle Containment (CAC)

Server racks are aligned into corridors in the data hall. The servers are powered through the ceiling, with aisle containment systems in place for effective cooling. By carefully separating cool air coming in on one side of the server and hot exhaust air going out on the other side, cold and hot air are prevented from mixing, which improves the efficiency of the data centre's cooling system.

mace | **ANAROCK**

Mace is an international consultancy and construction company, founded and built on exceptional people, a commitment to service excellence and a deep-rooted entrepreneurial spirit.

We are living in a world that is developing fast. Property and infrastructure projects and programmes are becoming more complex. The drive for sustainable development is ever more pressing. To create cities and communities that solve these challenges, we must look at solutions from all angles, innovating together to identify the best course of action.

Our people give us that perspective, with their experience, confidence, drive and commitment to always go the extra mile. Together we strive to build more efficiently, more sustainably, more intelligently and more economically – to create cities and communities that don't just function, but inspire. Our vision is to be the industry leader in shaping cities and building sustainable communities. Our mission is to continuously pursue a better way.

Mace employs over 6,300 people across five global hubs, with a turnover of £2.35 Bn. We develop, consult, construct and operate some of the world's most inspiring projects and programmes.

macegroup.com

ANAROCK is India's leading independent real estate services company with a presence across India and the Middle East. The Chairman, Mr. Anuj Puri, is a highly respected industry veteran and India's most prominent real estate thought leader. The Company has diversified interests across the real estate lifecycle and deploys its propREITary technology platform to accelerate marketing and sales.

ANAROCK's services include Residential Broking & Technology, Retail (in partnership with Vindico), Commercial, Investment Banking, Hospitality (via HVS ANAROCK), Land Services, Industrial and Logistics (in partnership with Binswanger), Investment Management, Research, Strategic Advisory & Valuations and Project Management Services (in partnership with Mace). The Company has a unique business model, which is an amalgamation of traditional product sales supported by a modern technology platform with automated analytical and reporting tools. This offers timely solutions to its clients, while delivering financially favourable and efficient results.

ANAROCK has a team of over 1,800 certified and experienced real estate professionals who operate across all major Indian (Mumbai, Navi Mumbai, Pune, Ahmedabad, NCR – Delhi, Gurugram, Noida, Chennai, Bangalore, Hyderabad, Kolkata, Lucknow) and Middle East markets, and within a period of two years, has successfully completed over 400 exclusive project mandates. ANAROCK also manages over 80,000 established channel partners to ensure global business coverage.

Our assurance of consistent ethical dealing with clients and partners reflects our motto - Values Over Value.

anarock.com

AUTHORS

Pawan Maini I Regional Director, Mace India

Devi Shankar I President – Industrial & Logistics | Data Centres ANAROCK Capital

CONTRIBUTORS

John Jeffery I Data Centre Technical Director, Mace
Nick Garniss I Operations Director, Facilities, Mace
David Jacobs I Associate Director, Facilities, Mace
Richard Margetts I Associate Director, Facilities, Mace
Campbell McCurrach I Sr. Project Manager, Consultancy, Mace

Prashant Thakur I Director & Head – Research, ANAROCK
Dr. Paridhi Gupta I Deputy Vice President - Design, ANAROCK

FOR BUSINIESS ENQUIRIES, PLEASE CONTACT

Pawan Maini
Regional Director, Mace India
pawan.maini@macegroup.com

Shobhit Agarwal
MD & CEO, ANAROCK Capital

Devi Shankar
President – Industrial & Logistics | Data Centres
devi.shankar@anarock.com

Mace Project & Cost Management Pvt. Ltd.
Platina Tower, # 01A171 & 01A172
MG Road, Sector 28, Near Sikandarpur Metro Station
Gurugram - 122 002, India
+91 124 436 8216

ANAROCK Capital Advisors Pvt. Ltd.
1002, 10th Floor, B Wing, ONE BKC
G Block, Bandra Kurla Complex, Bandra (E)
Mumbai – 400 051, India
+91 22 4293 4206