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The Coming Surge

AI’s Impact On Indian Power Infrastructure

The Coming Surge: AI → Megawatts

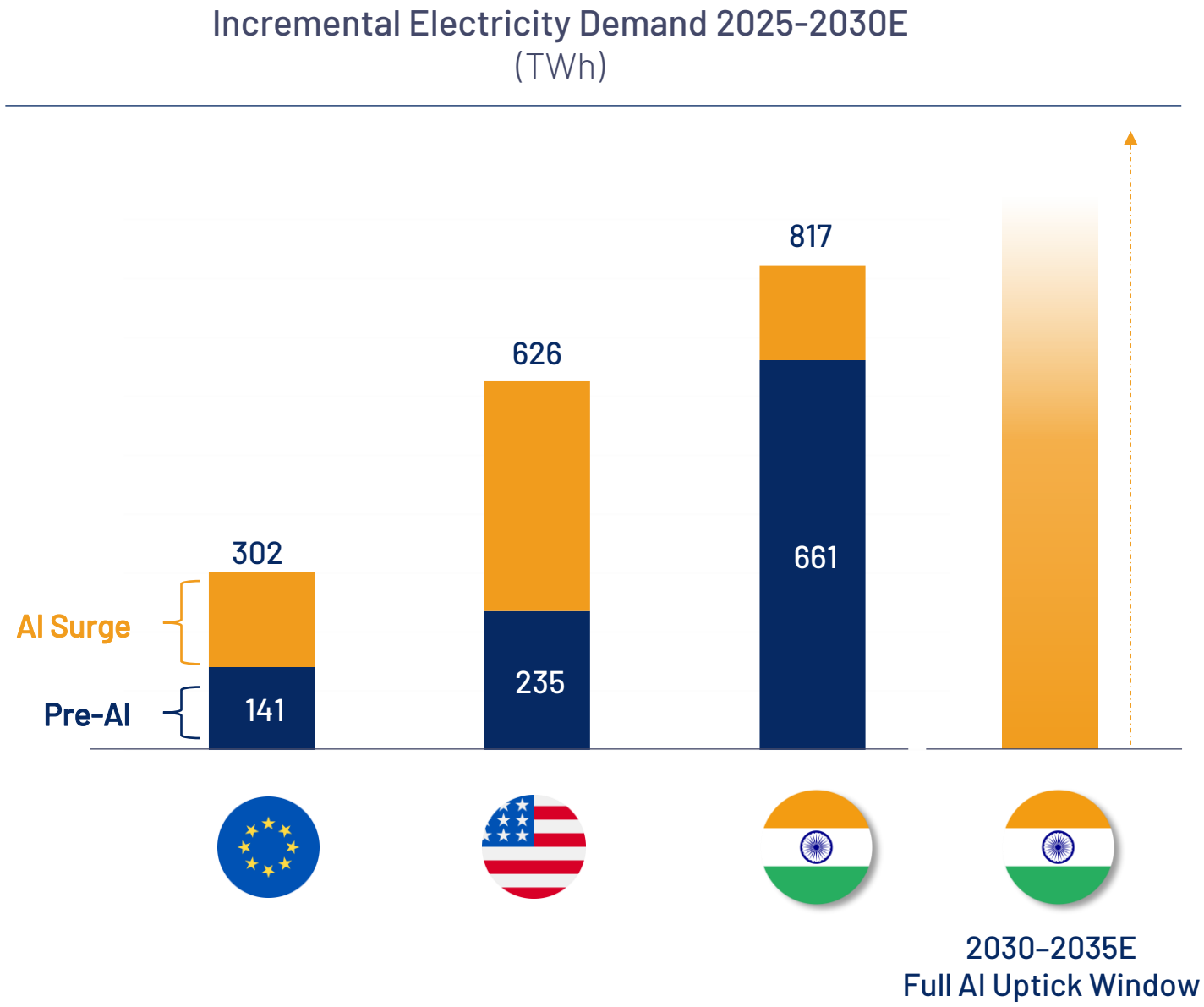
Globally, AI investment is triggering a paradigm shift in electricity demand. Power has become the new constraint for digital growth. With rapidly rising computation needs, AI data centers are already outbidding factories for grid access, and electricity is becoming the proxy metric for AI capacity. Global data center power use could exceed 1,500 TWh by 2030—greater than Japan's total electricity consumption—making data centers the fourth-largest "country" by power use and triggering a massive capex cycle in grid and generation.

In India, the story starts from a low base but a steep trajectory. With near-universal household electrification achieved, rising incomes and appliance ownership are already lifting demand—even before AI related impact. As a result, India's incremental power demand over the coming years *excluding* data centers comfortably exceeds even optimistic projections of new power demand in the US *including* the spike in AI-led consumption.

But India also accounts for one fifth of the world's mobile data traffic; as AI adoption deepens and data centers proliferate, that digital load will add a new layer of electricity demand. Meeting that surge will require enormous investment across the power value chain.

Who finances it? In India, specialized power financiers dominate long-tenor project funding—an area where banks struggle. Their loan books are expanding along with the grid and generation ecosystem, making them a primary catalyst, and beneficiary, of the coming electricity super-cycle.

The AI Era: Power Demand Rerated Globally



AI-related workloads meaningfully lift electricity demand, adding nearly 3× more incremental requirement versus pre-AI expectations.

India is already seeing a sharp rise, with AI providing an additional kicker. For India, the AI-led step-chang becomes even larger post-2030 as data-center capacity scales up dramatically.

Note: Pre-AI forecasts reflect growth expectations as of early-2023 estimates. In India, the upward revision (AI surge) also includes non-AI demand drivers, with AI-related data center growth the primary contributor
Source: Morgan Stanley, Goldman Sachs, IEA (International Energy Agency), ICR

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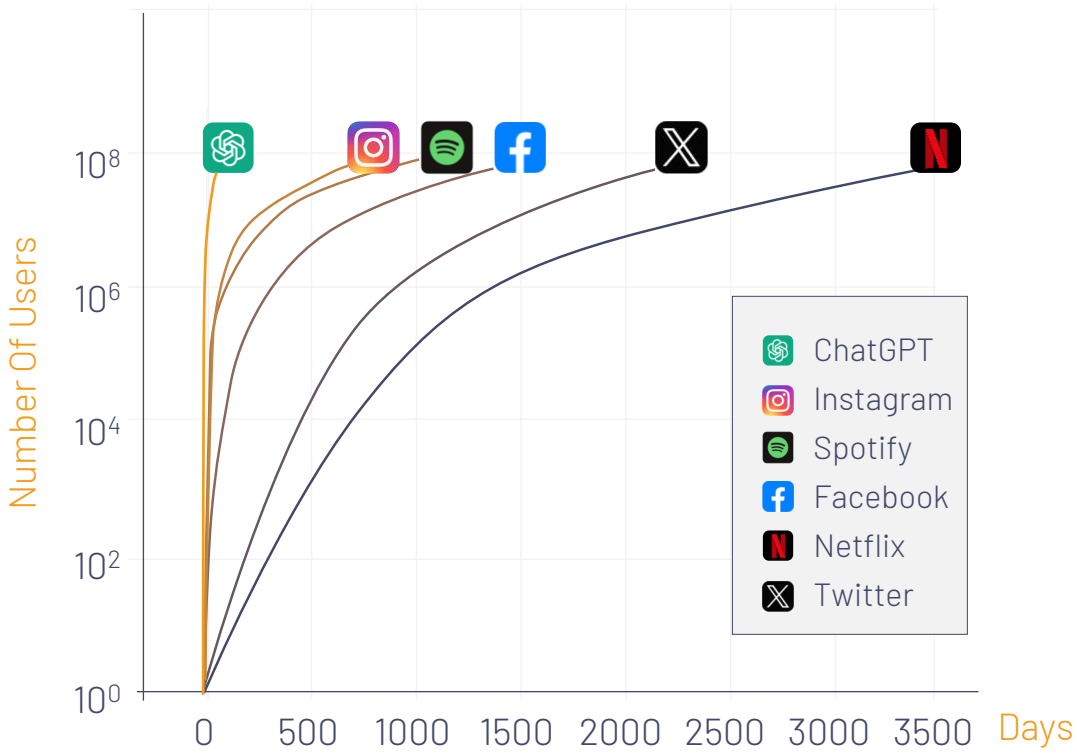
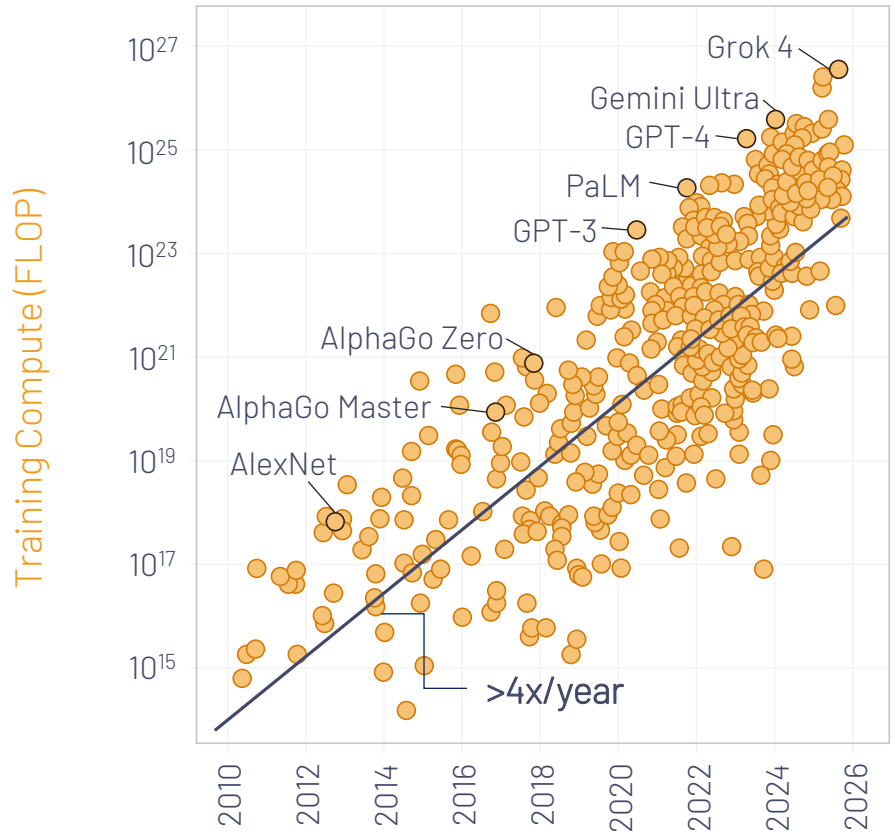
The AI-Power Link

More Compute...

Steep Rise In AI Adoption...
(Days Taken To Reach 100M Users)



...And In Model Compute Needs
(Computation To Train AI Models)



AI systems like ChatGPT have scaled faster than any technology —now handling ~2B queries per day. Each query activates large neural networks, a task far more computationally intensive than traditional retrieval search.

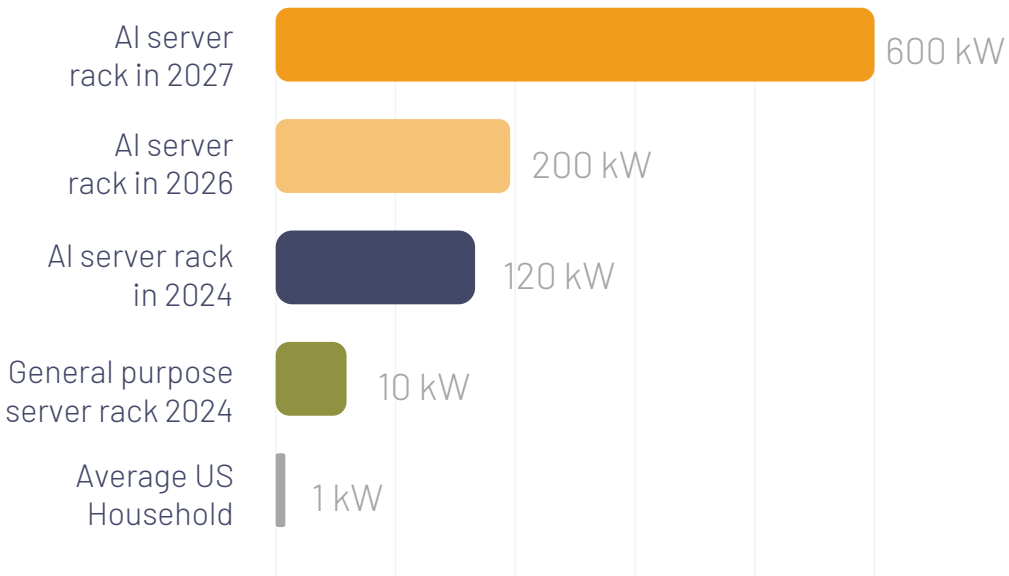
With every generation—GPT-3 → GPT-4 → Gemini—the compute required to train and operate models has jumped dramatically. New model compute requirements have risen roughly 4–5x every year since 2010. Thus, total computation requirements are growing from both sides: more users × a lot heavier models.

Source: Epoch, PC Mag, Deloitte

...Needs More Power

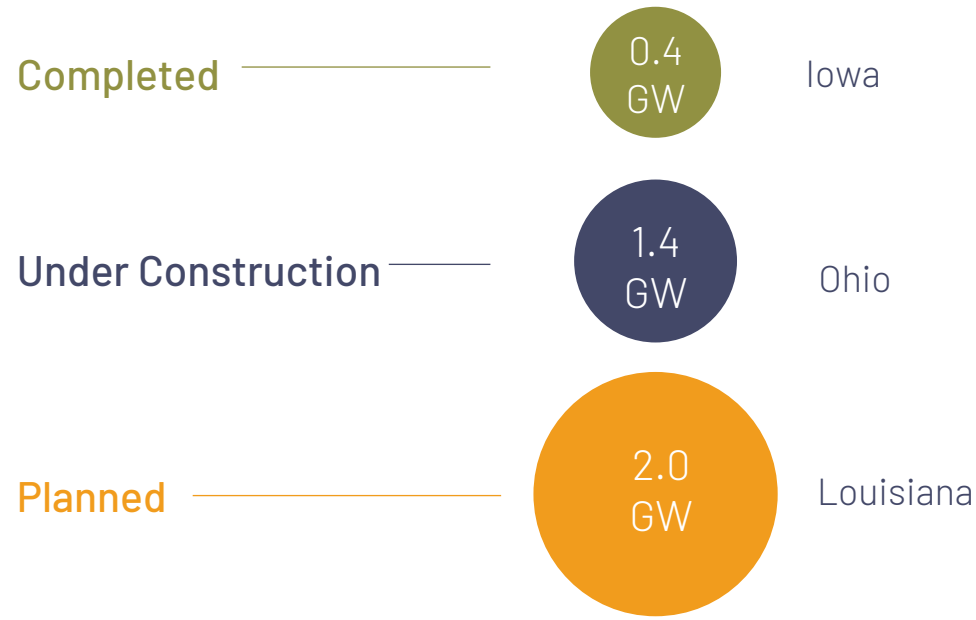
AI Load → Rising Power Per Cabinet

(Power Density = kW / Rack)



Data Centers ≫ Million Household

(Capacities Of Largest US Data Center In Each Category)



All that computation runs on hardware—and hardware runs on electricity. AI models rely on thousands of GPUs working in parallel. Also, more GPUs are being packed into ultra-dense racks, which is driving up not only compute density but also power density to new extremes.

By 2027, a state-of-the-art rack (about the size of a filing cabinet) will house 500+ GPUs and draw ~600 kW power —enough for >500 US homes—roughly 50x a typical server rack of today that powers the internet.

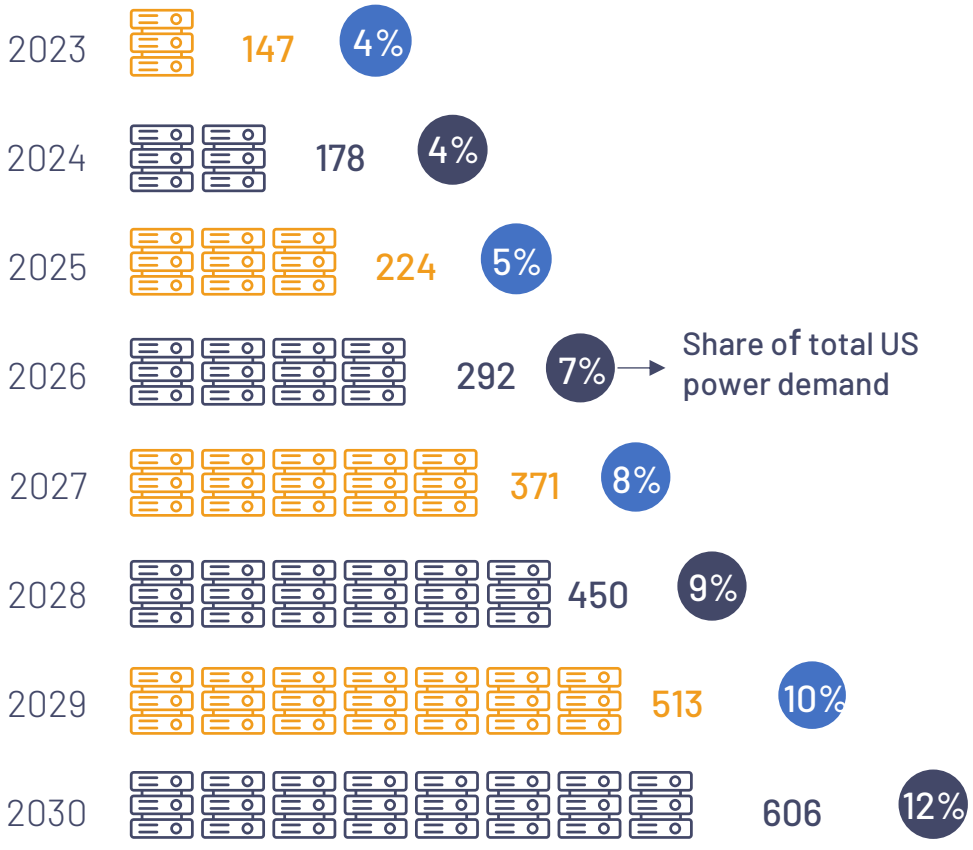
And it's not just one rack. Thousands of such racks are being stacked into ever-larger data centers. The biggest AI data centers now planned are gigawatt-scale, with site loads comparable to millions of homes.

Source: Goldman Sachs, Deloitte

Electricity - The Fuel of the AI Age

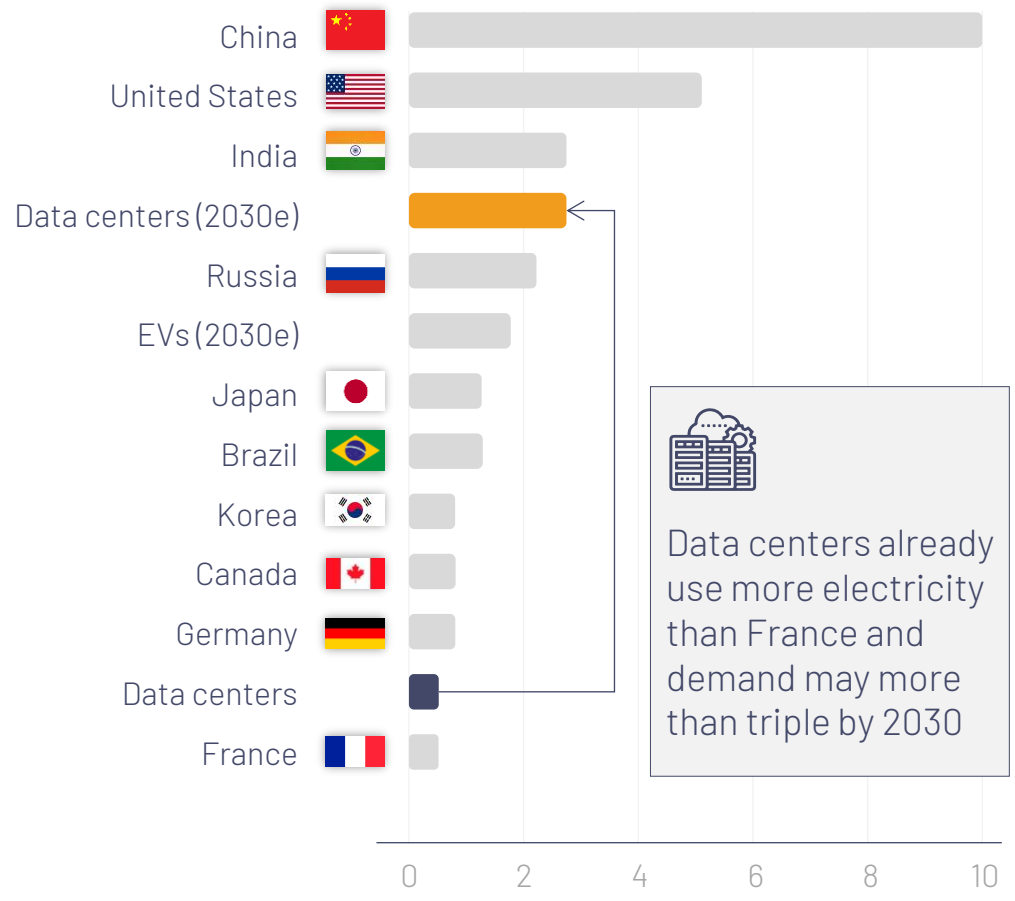
U.S. Data Centers: Rising Electricity Use

Data center energy consumption (TWh)



Global Power Demand: AI Era Step-Up

Electricity demand 2023; thousands of terawatt-hours



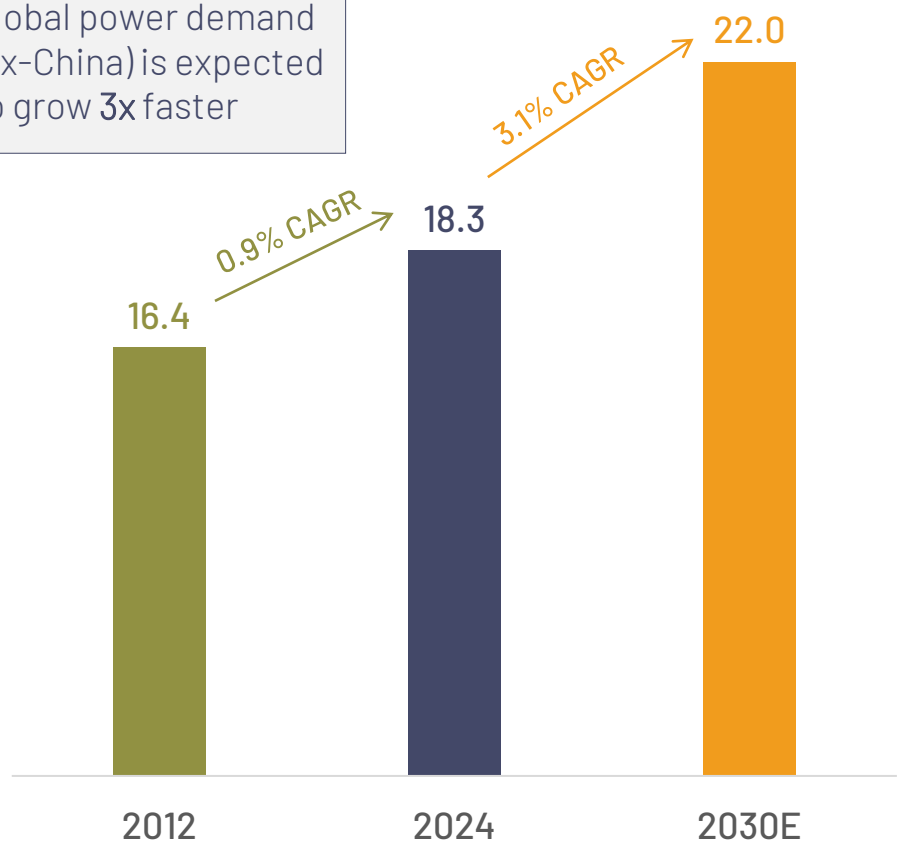
AI and data centers are becoming the primary drivers of power demand growth. In the US, data centers are expected to account for over two-thirds of incremental electricity demand this decade.

Source: McKinsey, IEA (International Energy Agency)

End Of Flat Load Curves - Power Demand Forecasts Are Being Revised Upwards

Global Power Demand Outlook
(Ex-China; Trillion kWh units)

Global power demand (ex-China) is expected to grow **3x** faster



US & Europe – Upward Revisions
(Power Demand, CAGR)

Last 15 Years	0.4%	-0.6%
Estimates to 2030 (in 2023)	1.1%	1.0%
Estimates to 2030 (now)	**2.7%**	**2.1%**

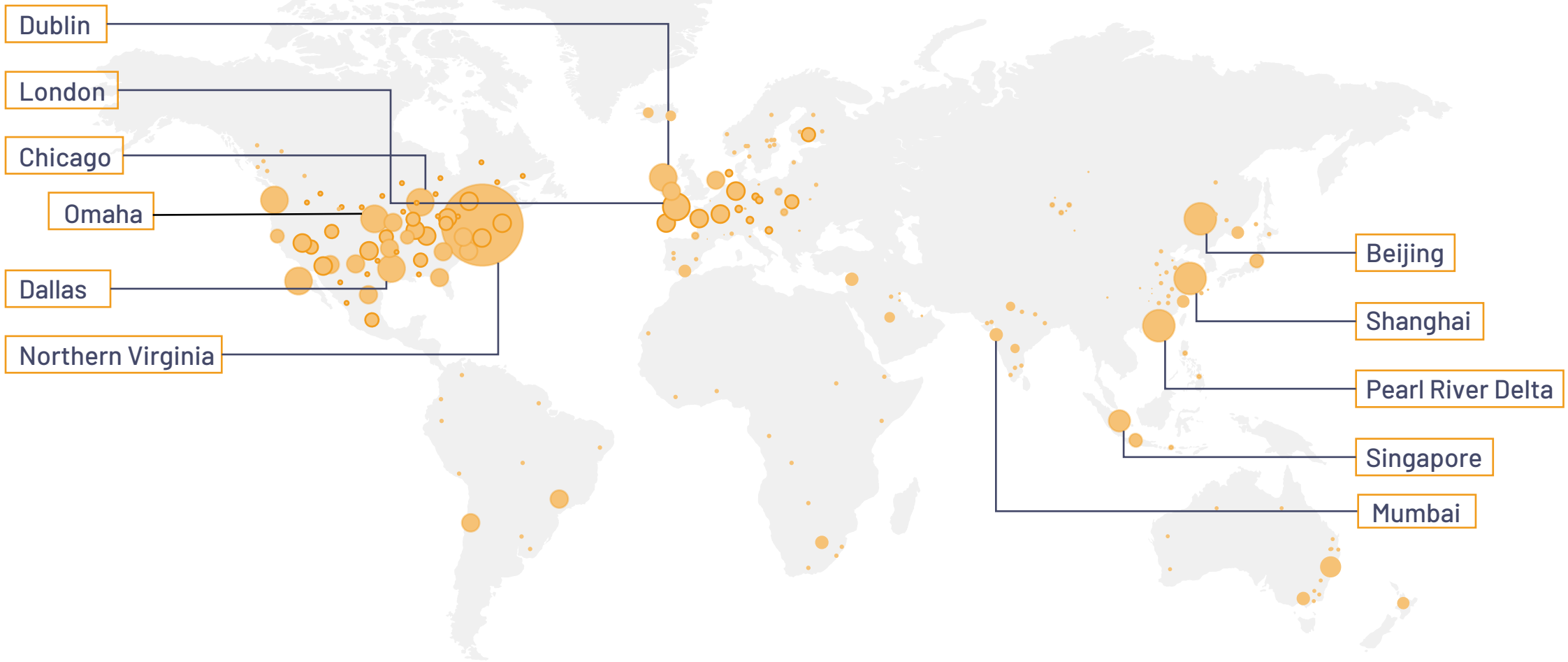
After decades of stagnation, power demand in mature economies is rising again. Forecasts across major markets have been revised up year after year.

Source: Morgan Stanley, Goldman Sachs, Jefferies

Concentrated Demand, Stressed Grid

Data Centers Are Clustered — Creating Challenges For The Grid

(Global Hotspots Of Data Center Clusters)



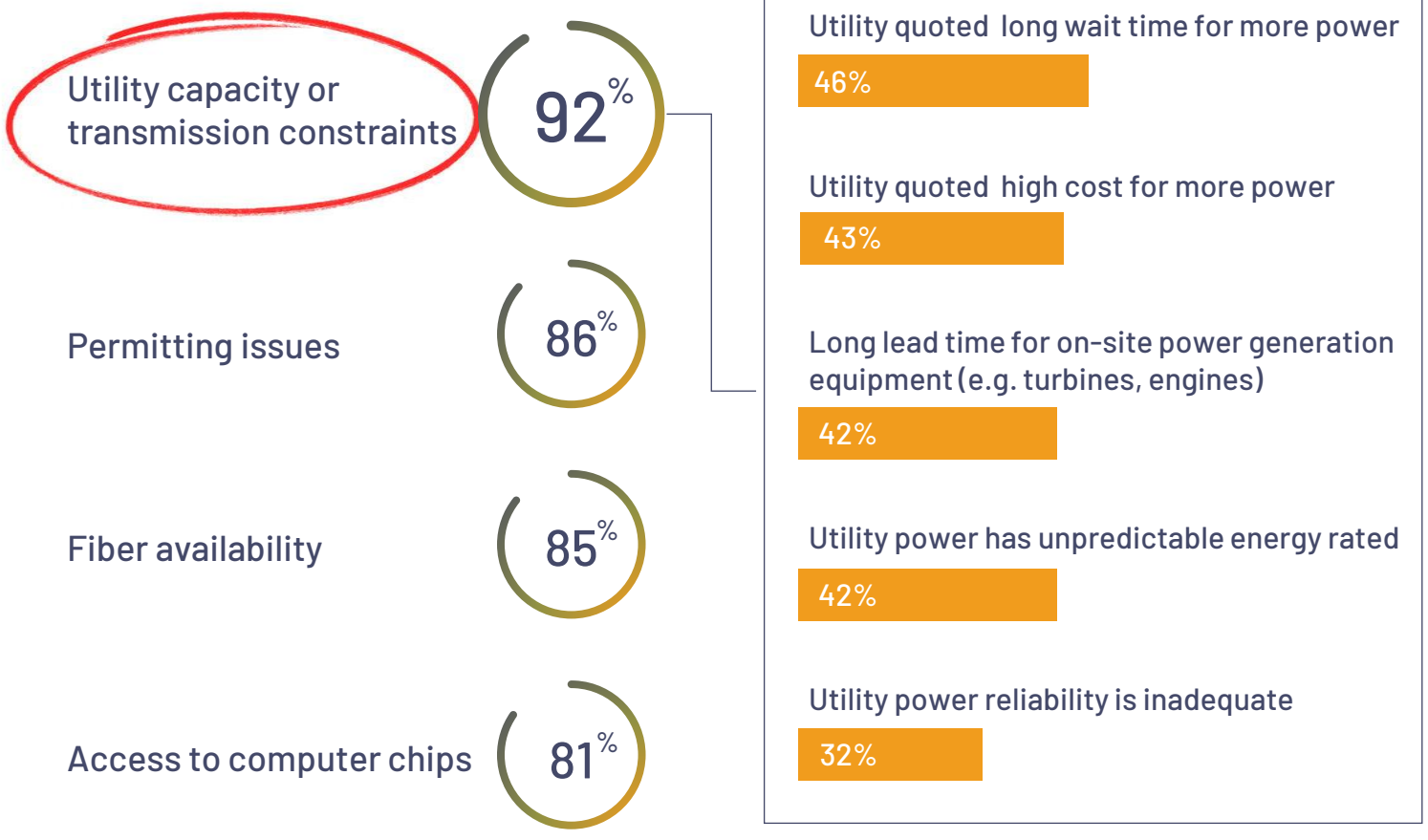
Data centers cluster around big cities, creating large, 24×7 concentrated loads. These hubs strain transmission and distribution networks, which now require substantial upgrades.

Note: The size of each circle corresponds to the data-center capacity at that location
Source: IEA

Power The Key Bottleneck?

What's Slowing data center Projects (Schneider Survey)

Which obstacles to building more data centers are most significant right now, and what's driving the overall concern?



"The **biggest issue** we're having isn't a compute glut—it's **power...** You may actually have a bunch of chips sitting in inventory that I can't plug in. It's not a supply issue of chips; it's that **I don't have warm** shells (data centers with power) to plug into."

Satya Nadella,
Microsoft CEO

Electricity availability is now cited as the top reason for data center project delays. The constraint is shifting from chips to power. That is set to drive major investment in power infrastructure worldwide.

Source: Schneider Electric, TechCrunch

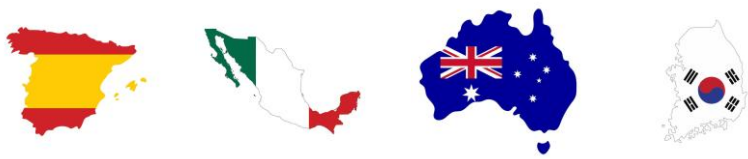
AI Is Triggering The Largest Grid Buildout Ever

Cost Of Compute

$7 Trillion

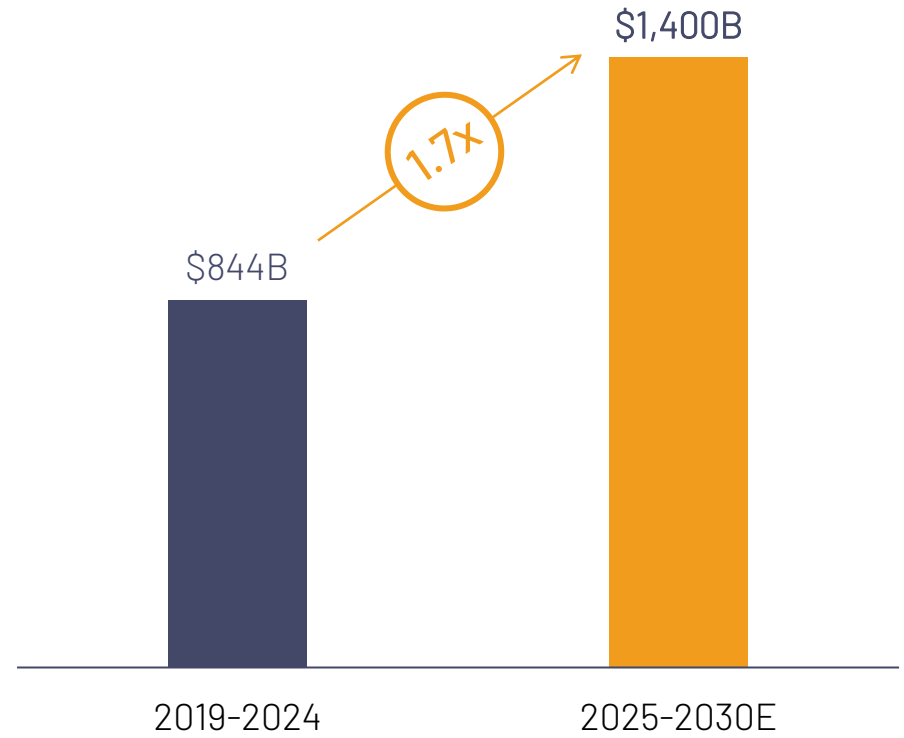
Global Data center value-chain investments through 2030

Greater than the combined GDP of Spain, Mexico, Australia, and South Korea



US Utilities Must Nearly Double Capex

(US Electric And Multiutility Capex)

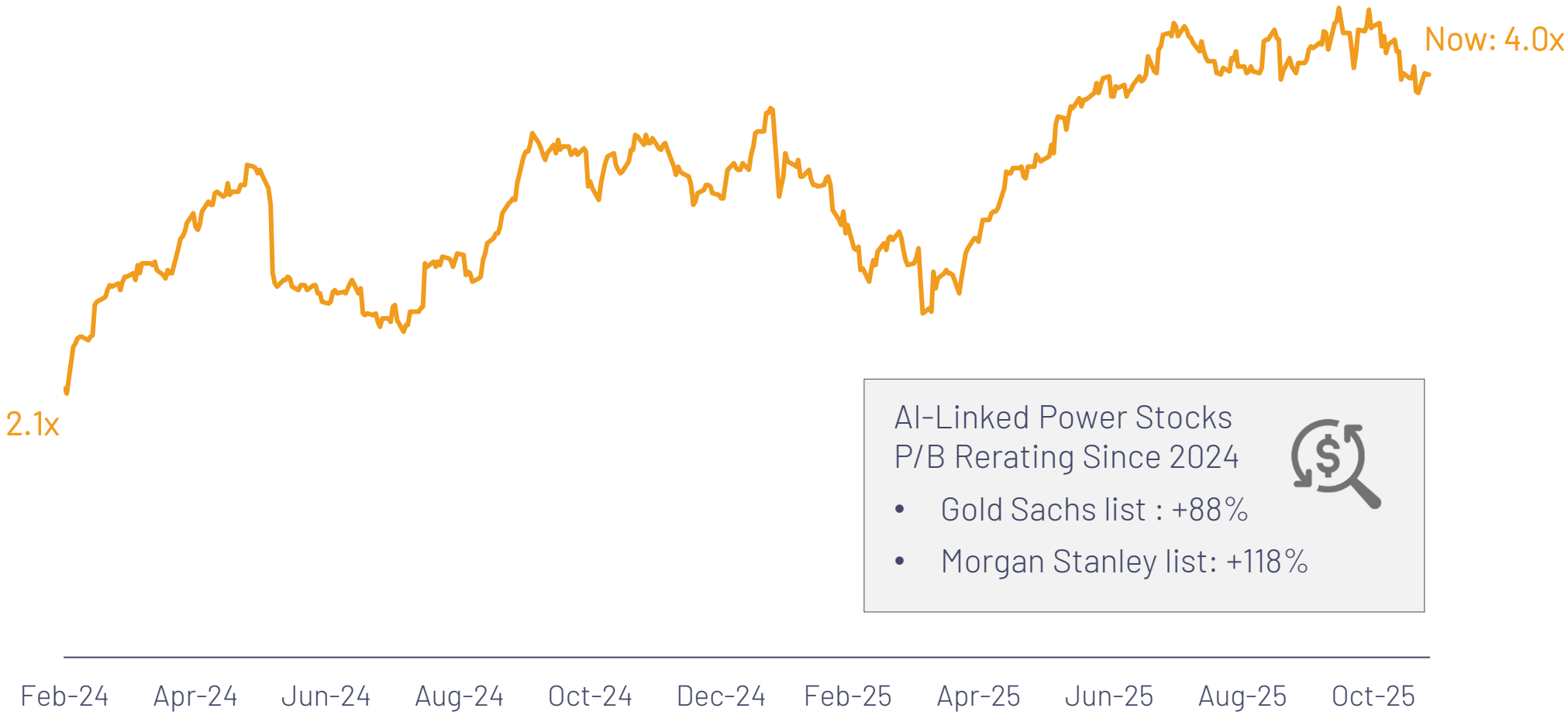


With electricity emerging as the key bottleneck in the AI era, utilities are entering their largest upgrade cycle in decades. In the US alone, utility capex will need to rise to nearly $1.4 trillion by 2030 — almost matching the combined capex of the previous twelve years.

Source: McKinsey, Deloitte, S&P Global, IMF

Power Stocks Are Rerating

From "Bond Proxies" To Growth Stories
(Goldman Sachs Power Up America Index; P/B - 1Y Fwd.)



AI-Linked Power Stocks
P/B Rerating Since 2024

- Gold Sachs list : +88%
- Morgan Stanley list: +118%

Note: Goldman Sachs Power UP America Index consists of US-listed equities that are expected to benefit from the growing demand of power, driven by electrification, EV's, data centers, & reshoring.
Source: Bloomberg, Morgan Stanley, Goldman Sachs

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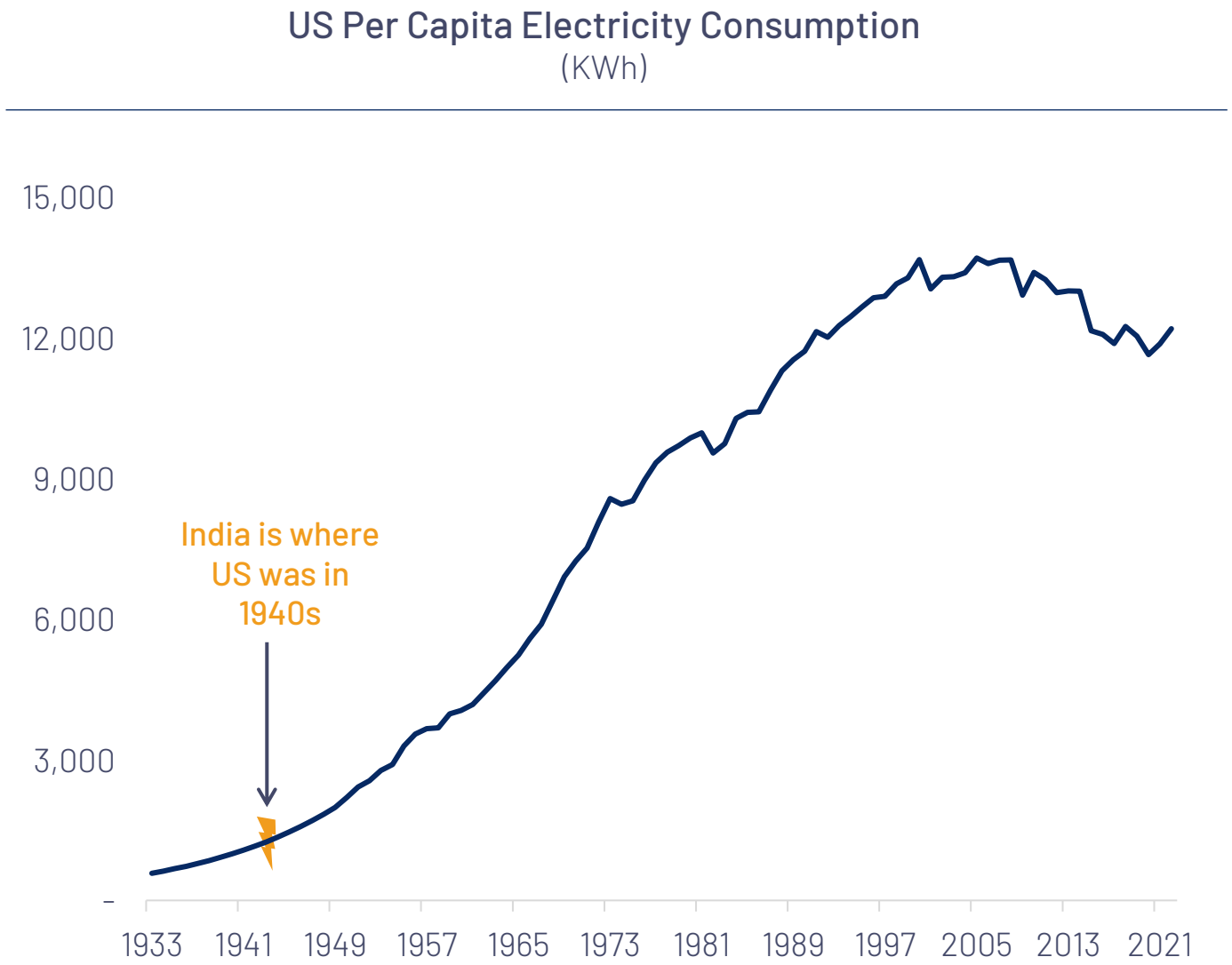
India

India Starts At A Very Low Base

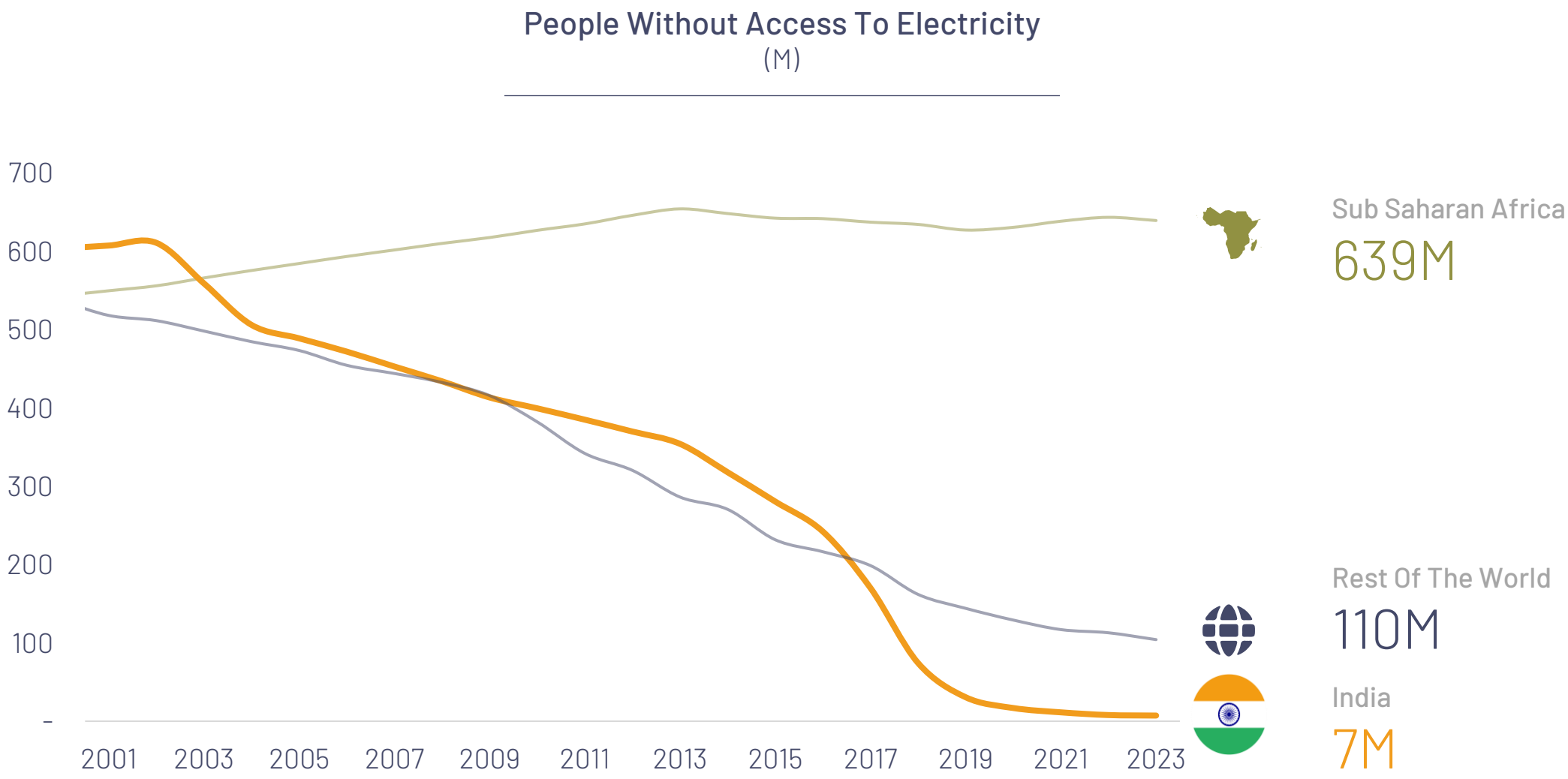


India consumes barely a tenth of the electricity used by developed economies and about a third of the global average, although its power demand has been rising among the fastest globally.

Power is a high growth sector in India, with enhanced access to rural households now propelling demand from historically low levels.

Source: World Bank, IMF, International Energy Agency, Central Electricity Authority

Power For All - Nearly Every Indian Home Is Now On The Grid

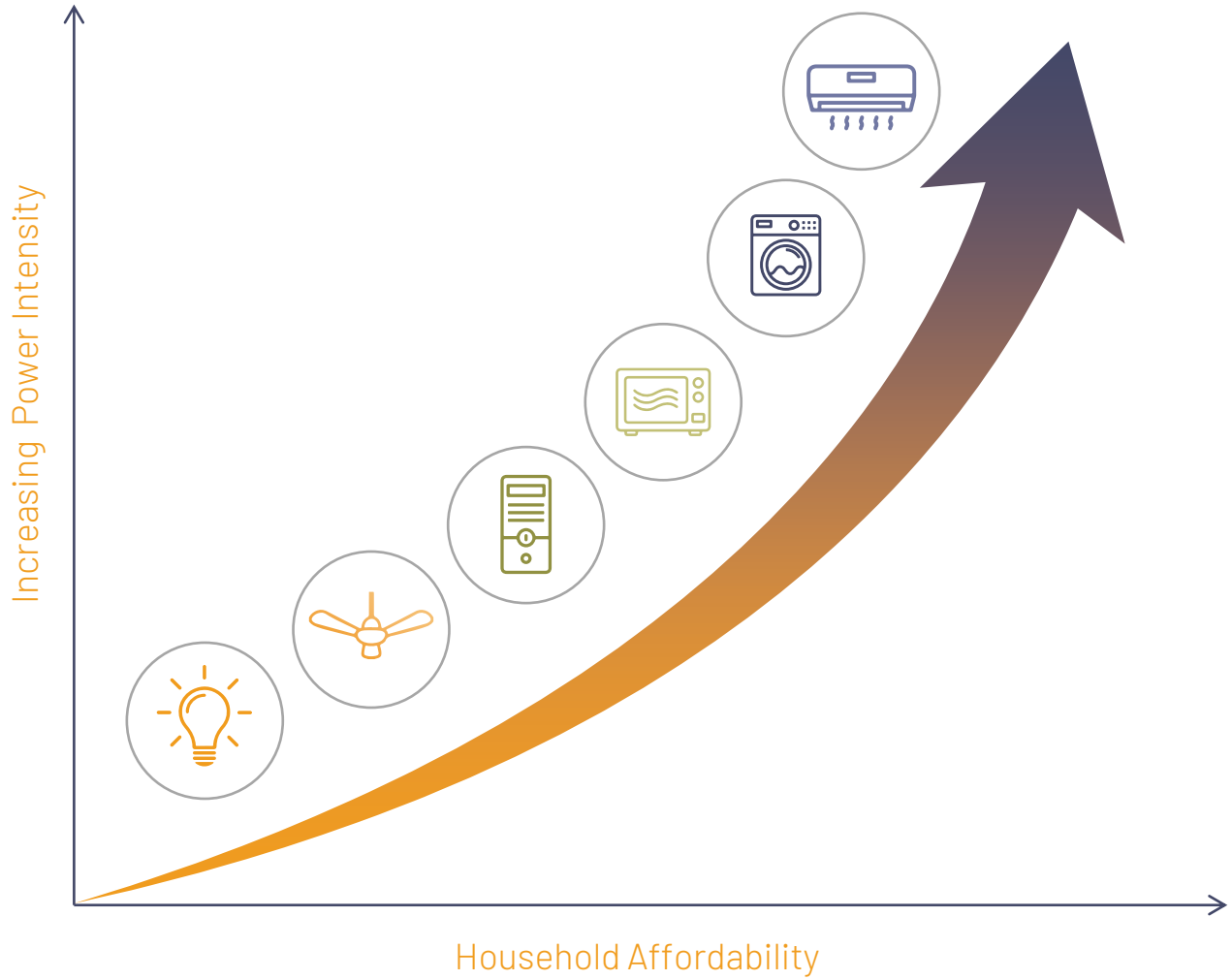


In just two decades, India has added nearly 600 million people to the electricity grid — one of the largest expansions in history. As these newly connected households see incomes rise, their electricity use will increase, and so will their demand for reliable, round-the-clock power — marking the next phase of India's electricity story.

Source: IEA, World Bank

Aspiration Will Power Consumption

Home Appliance Demand To Rise With Incomes

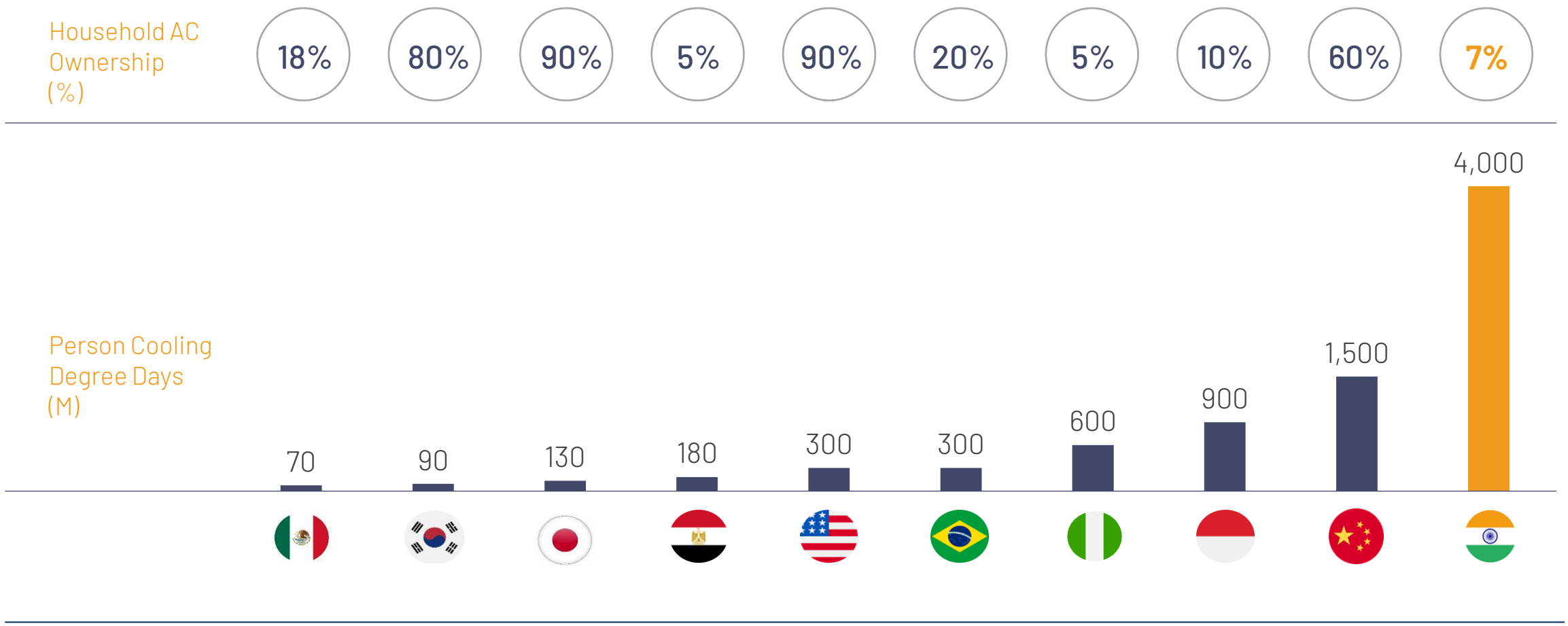


As incomes rise, electricity use is moving from basic lighting to comfort and convenience.

Cooling, refrigeration, and modern cooking appliances are seeing rapid adoption and will drive much of India's incremental power demand.

Cooling - A Matter Of Survival

India Has The Highest Cooling Needs, But Amongst The Lowest AC Ownership



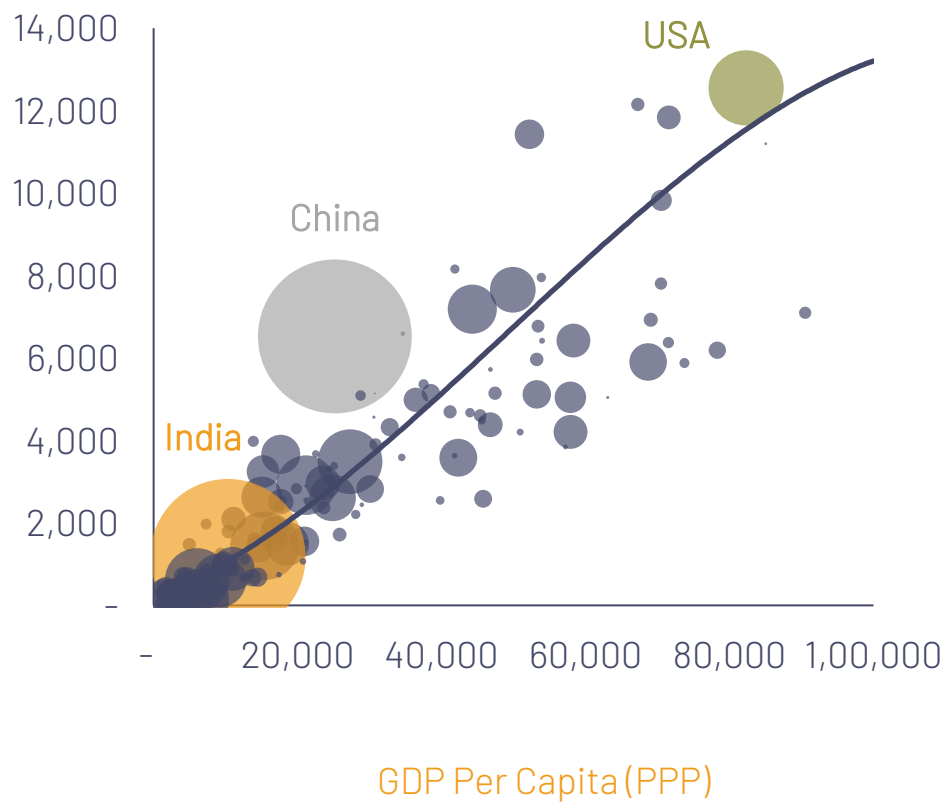
Large parts of India experience prolonged heat waves each summer, with temperatures frequently crossing 115°F. Yet, fewer than one in ten Indian homes have an air conditioner, compared to 42% overage globally and near-universal coverage in the US and China. Air conditioner sales are growing 15–20% annually and penetration could triple by 2035, adding hundreds of gigawatts of new power demand.

Note: Person Cooling Degree Days = cooling degree days multiplied by population, where cooling degree days measure how much average daily temperature exceeds 65°F
Source: World Economic Forum

India - At The Cusp Of Power Demand Inflection

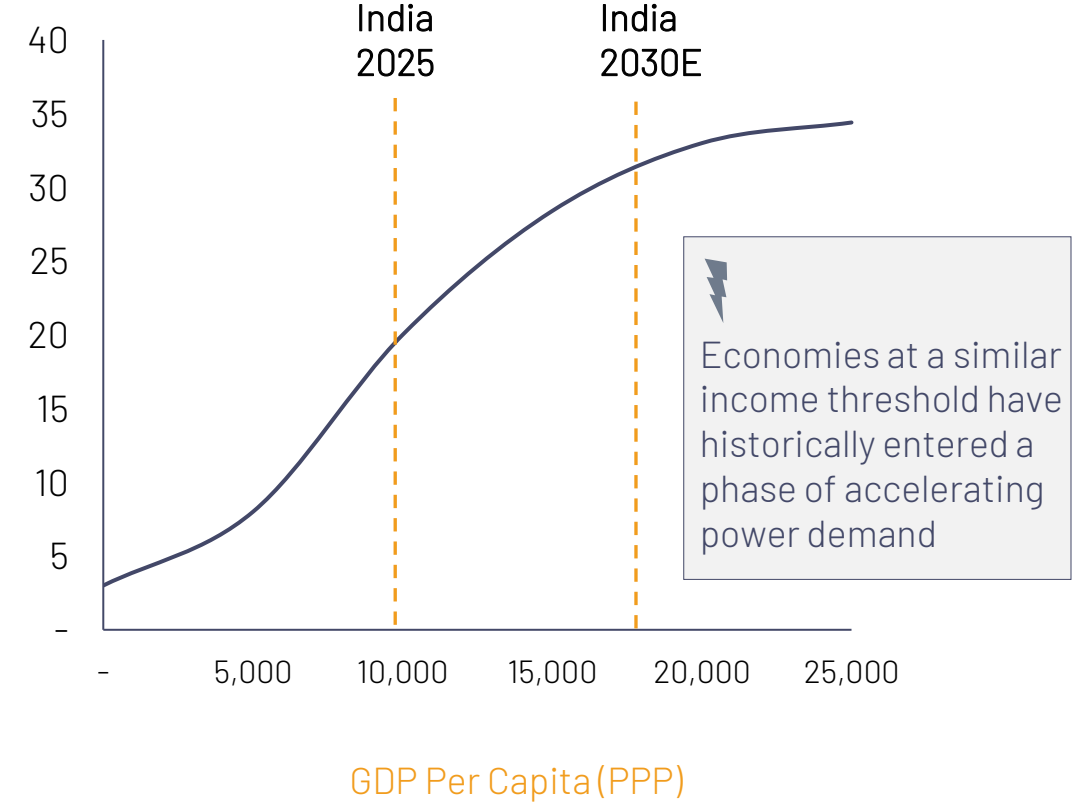
India's Power Use Tracks the Global Energy S-Curve

(Global: Power Demand Vs. Income)



India Enters the "Take-Off" Zone for Electricity Demand

(Global: Change In Power Consumption With Income)



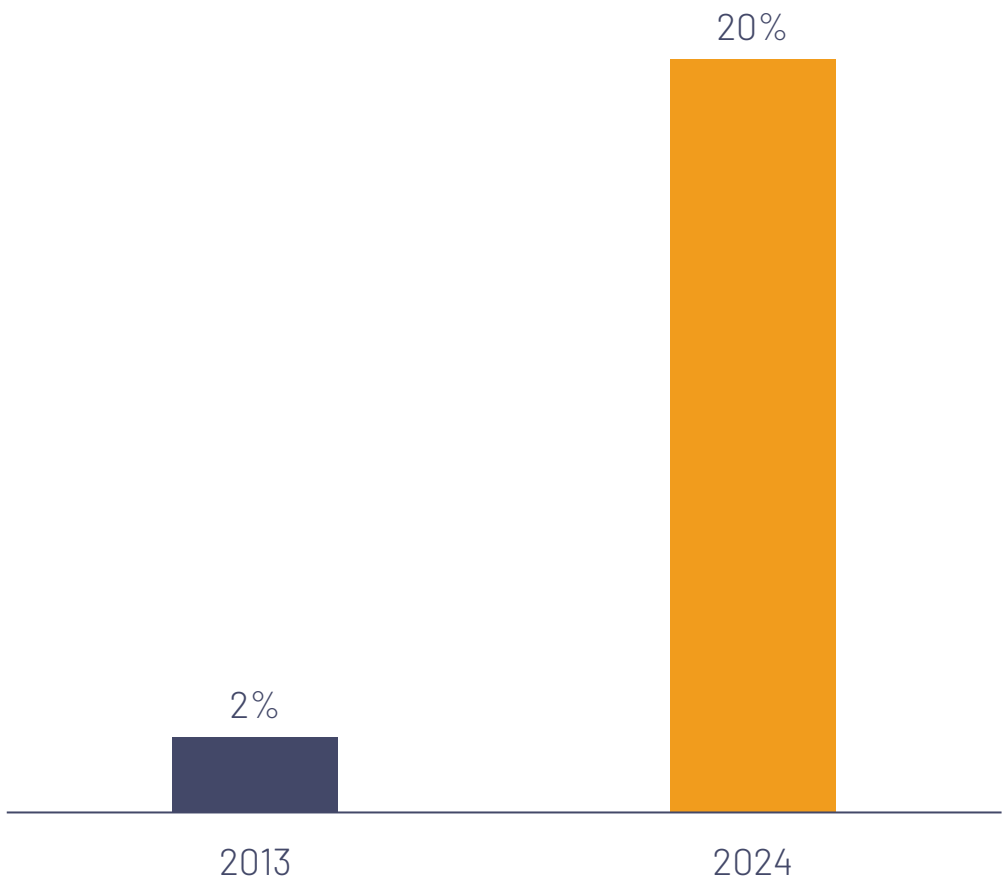
At comparable income levels, most economies have seen a sharp acceleration in per-capita electricity use. India is likely to follow the same path — supported by near-universal electrification, rising incomes, and rapid urbanization.

Source: Goldman Sachs, World Bank

India Is the World's Data Capital

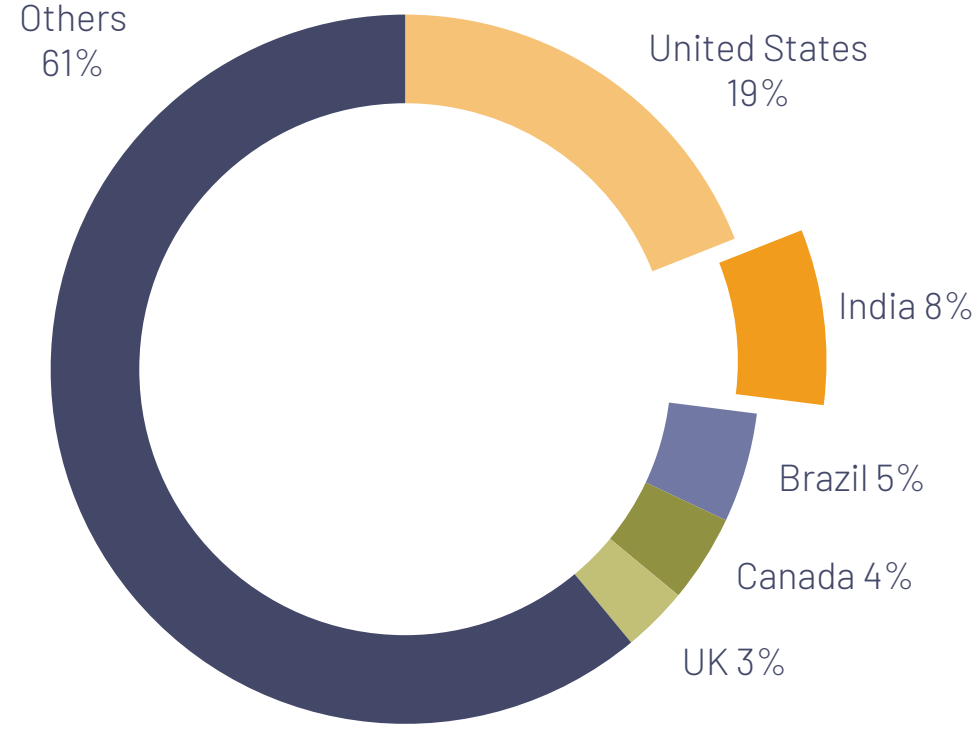
India Accounts For A Fifth Of Global Mobile Data...

India's Share Of Global Mobile Data Consumption



...And Has The Largest ChatGPT User Base Outside The US

ChatGPT Users Split By Country



With a median age of just 28, India is home to one of the youngest and most digitally connected populations in the world.

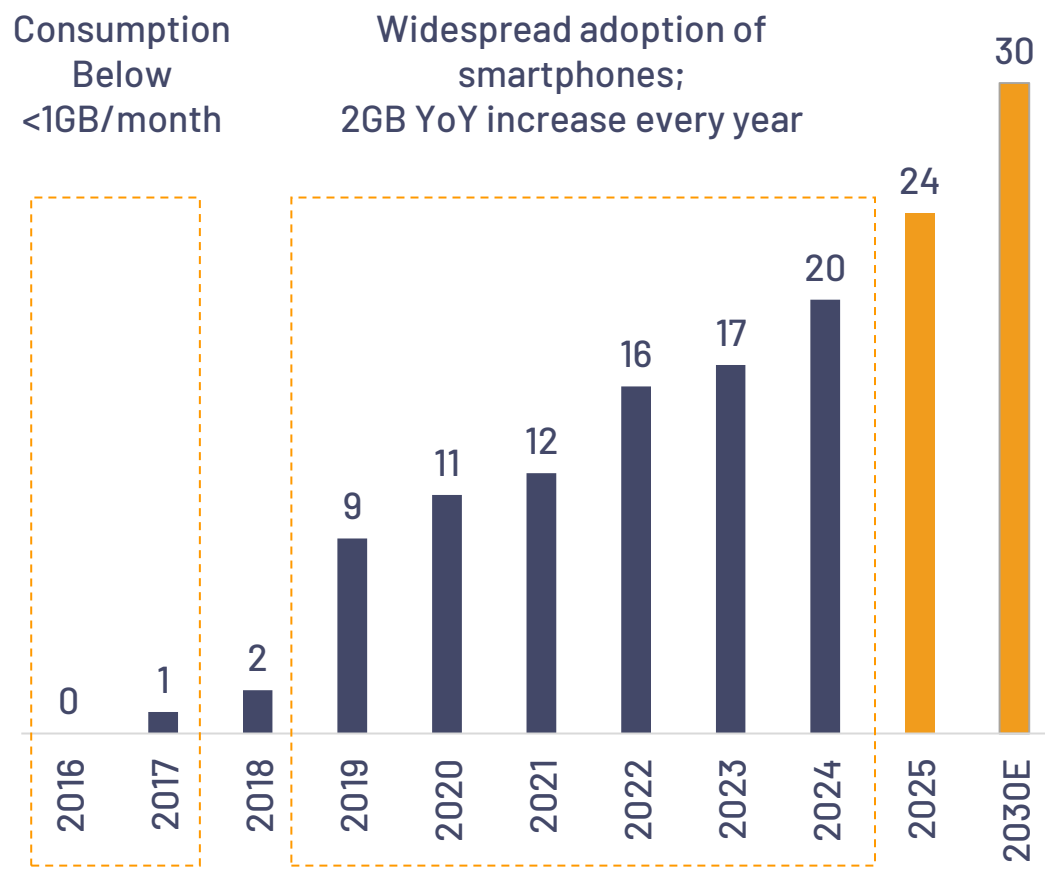
Source: GSMA, Ericsson, Avendus Spark

Data Consumption To Rise Further

Internet Penetration Still Expanding

	 2024	 2024	 2024	 2030E
Internet Penetration (%)	93%	80%	58%	**65%**
Smartphones (People, M)	289	1,105	550	**693**
Mobile Data (GB/Month/Smartphone)	22	25	25 - 30	**30 - 35**
Mobile Data per month (EB)	8	38	24	**30 - 35**

India – Mobile Data Consumption



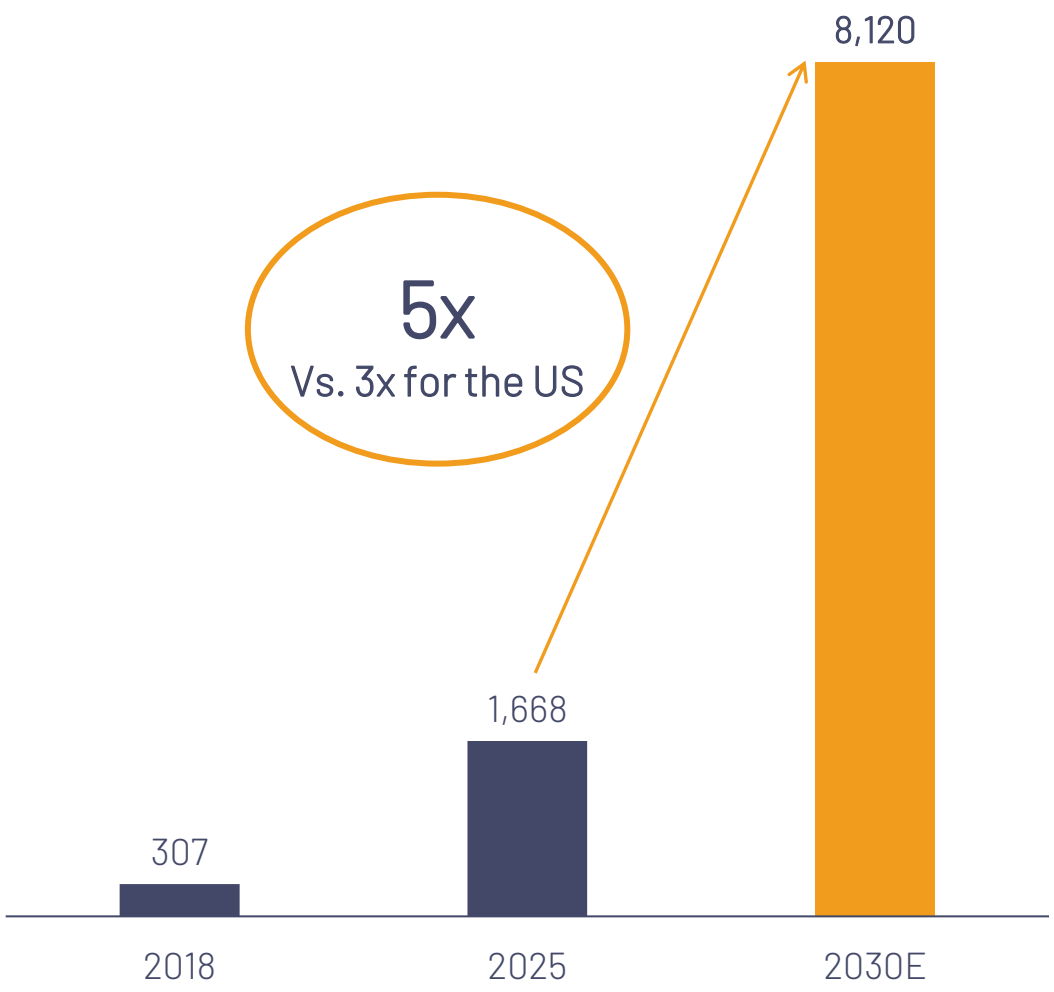
India's internet penetration remains far from saturation. As more users come online and data-heavy services like video, cloud storage and AI applications proliferate, data consumption per user will rise even further.

Source: Kotak MF, Avendus Spark

More Bandwidth Will Need More Watts

India's Data Center Capacity to Rise Sharply

(MW)



Growth Drivers for Data Centers in India
Rapid growth in internet, mobile, and digital transactions
Rising enterprise digitalization and cloud adoption
Policy push for data localization and domestic storage
Expanding hyperscale and edge data centers to reduce latency
India emerging as a global hub for data processing and storage given cost advantages and renewable power availability

Source: Jefferies, Kotak MF

Scale Of Investments Can Pick Up Sharply

TECH

Google to invest $15 billion to build data center hub in India; largest outside of the U.S.

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KEY POINTS

- The deal comes after "a year of intense discussions and relentless effort," and "is just the beginning," said Minister for Human Resources Development of Andhra Pradesh.
- Tech companies have been heavily investing in data centers to meet the computational needs of the AI boom.
- India is increasingly attracting multinational players to invest in the country's cloud and AI infrastructure.

Narendra Modi
@narendramodi

X.com

Delighted by the launch of the Google AI Hub in the dynamic city of Visakhapatnam, Andhra Pradesh.

This multi-faceted investment that includes gigawatt-scale data center infrastructure, aligns with our vision to build a Viksit Bharat. It will be a powerful force in democratizing technology. It will also ensure AI for All, delivering cutting-edge tools to our citizens, boosting our digital economy and securing India's place as a global technology leader!

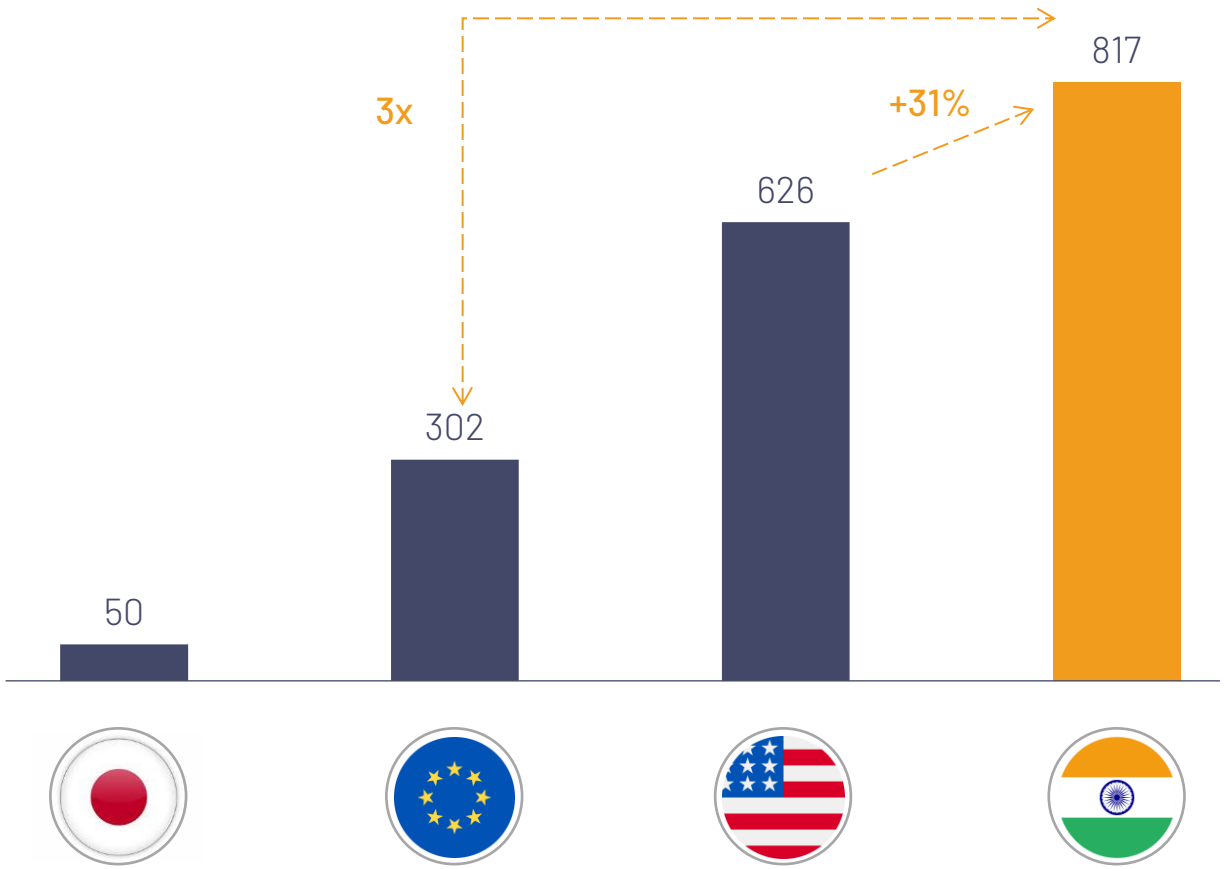
@sundarpichai

Recent announcements like Google's gigawatt-scale AI hub in India suggest that capacity build-outs could exceed current forecasts. The project, announced in Oct-25, is part of Andhra Pradesh's plan to develop 6 gigawatts of data center capacity by 2029 — in just one state. If realized, this could lift the current national forecast of 8 gigawatts significantly higher.

Source: CNBC, X (Twitter)

Power Capex Enters A Stage Of Exceptional Growth

Increase In Electricity Demand By 2030
(2025-2030; TWh)



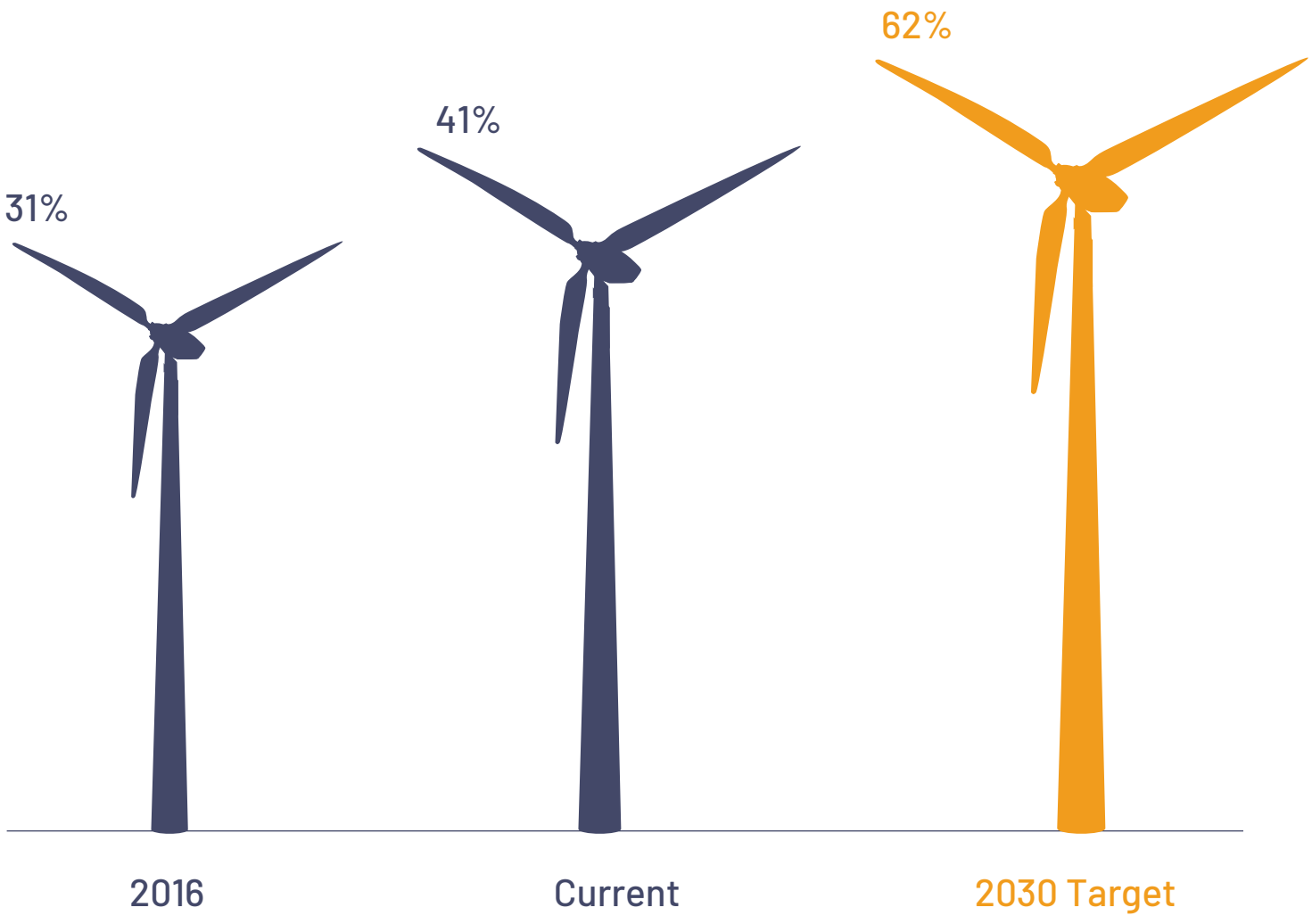
A combination of structural drivers points to a decade of exceptional power demand growth for India.

The scale of expansion is striking, even against the backdrop of strong demand growth in the U.S. and Europe. AI and data center loads will add a new and powerful layer to India's electricity needs, keeping power demand growth elevated well beyond 2030.

Source: International Energy Agency, Ember Energy

Renewables To Shoulder India's Power Surge

India - Renewables' Share Of Total Generating Capacity



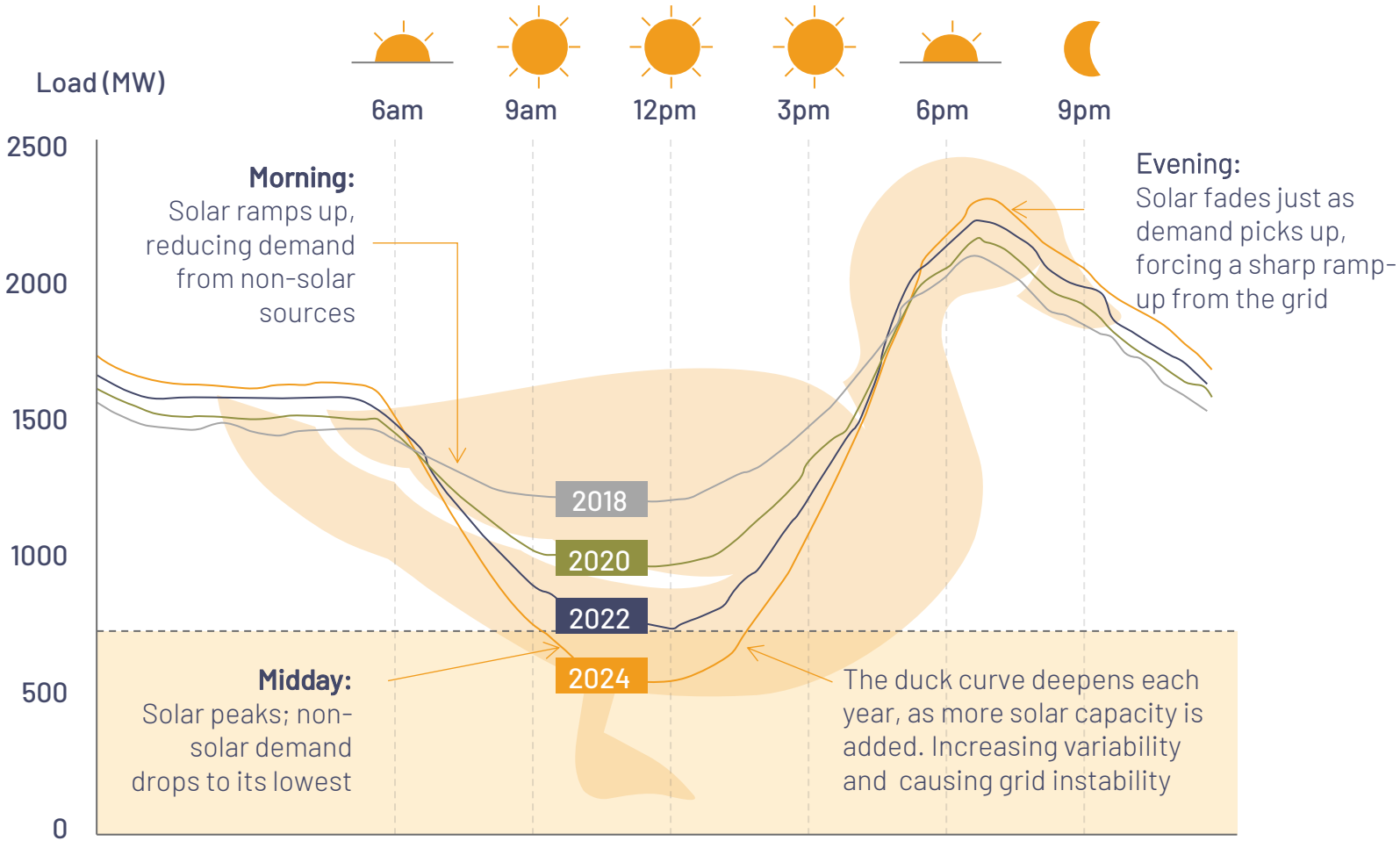
Corresponding numbers for US:

2016:	19%
Current:	31%

Source: Ministry Of Power – Government Of India, Federal Energy Regulatory Commission – US

India’s Grid Challenges (1/2): The Timing Problem

India’s Deepening Duck Curve
(Lines represent demand the grid must supply after solar is removed)



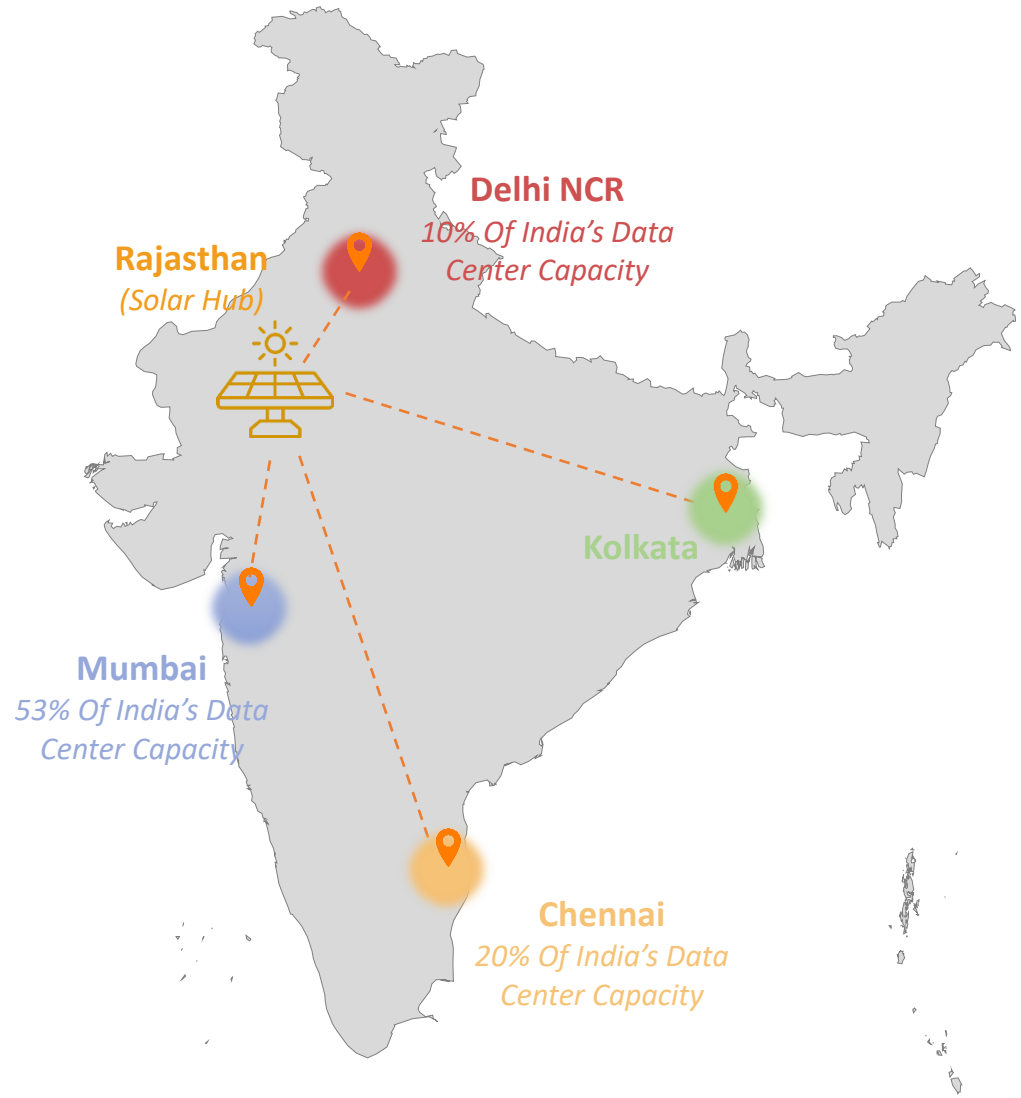
Solar’s big challenge is its variability. As solar ramps up in the morning, it reduces the demand that must be met by other sources.

At midday, solar output is high and non-solar demand collapses. But as the sun sets, solar falls sharply just as evening demand peaks — forcing the grid to ramp up supply from other sources quickly. This steep daily swing, the “duck curve,” is putting increasing strain on the grid.

Note: Data shown is illustrative; India follows a similar trajectory (Professor Nikit Abhyankar)
Source: Institute For Energy Economics And Financial Analysis

India’s Grid Challenges (2/2): The Geography Problem

Solar Here, Data Centers There
(Solar Supply Hubs and Heavy-Load Data Center Regions)



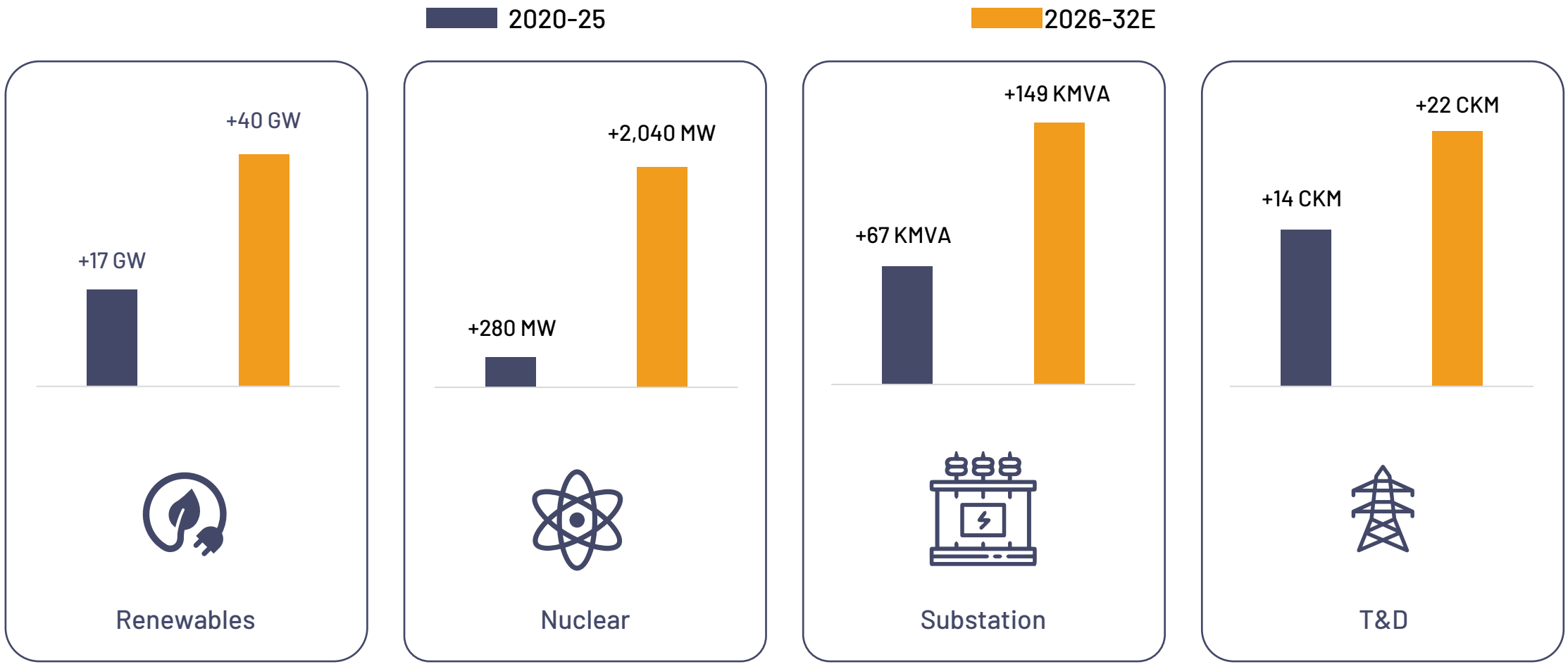
Solar supply is concentrated in the northwest, while demand—especially from data centers—is clustered in metros like Mumbai and Chennai in the west and south. This geographic mismatch requires new high-capacity transmission corridors to move power efficiently.

With over 70% of India’s data center load concentrated in just two cities—and much of the upcoming capacity also centered around a few metros—these heavy demand clusters will place further pressure on the grid.

Source: CBRE, Hindustan Times

India - Capacity Additions To Accelerate Across The Power Value Chain

Average Annual Capacity Addition



Note: Periods refer to Indian financial years between April and March. For instance, 2025 represents the period from April 2024 to March 2025
Source: Ministry Of Power, Avendus Spark, Morgan Stanley

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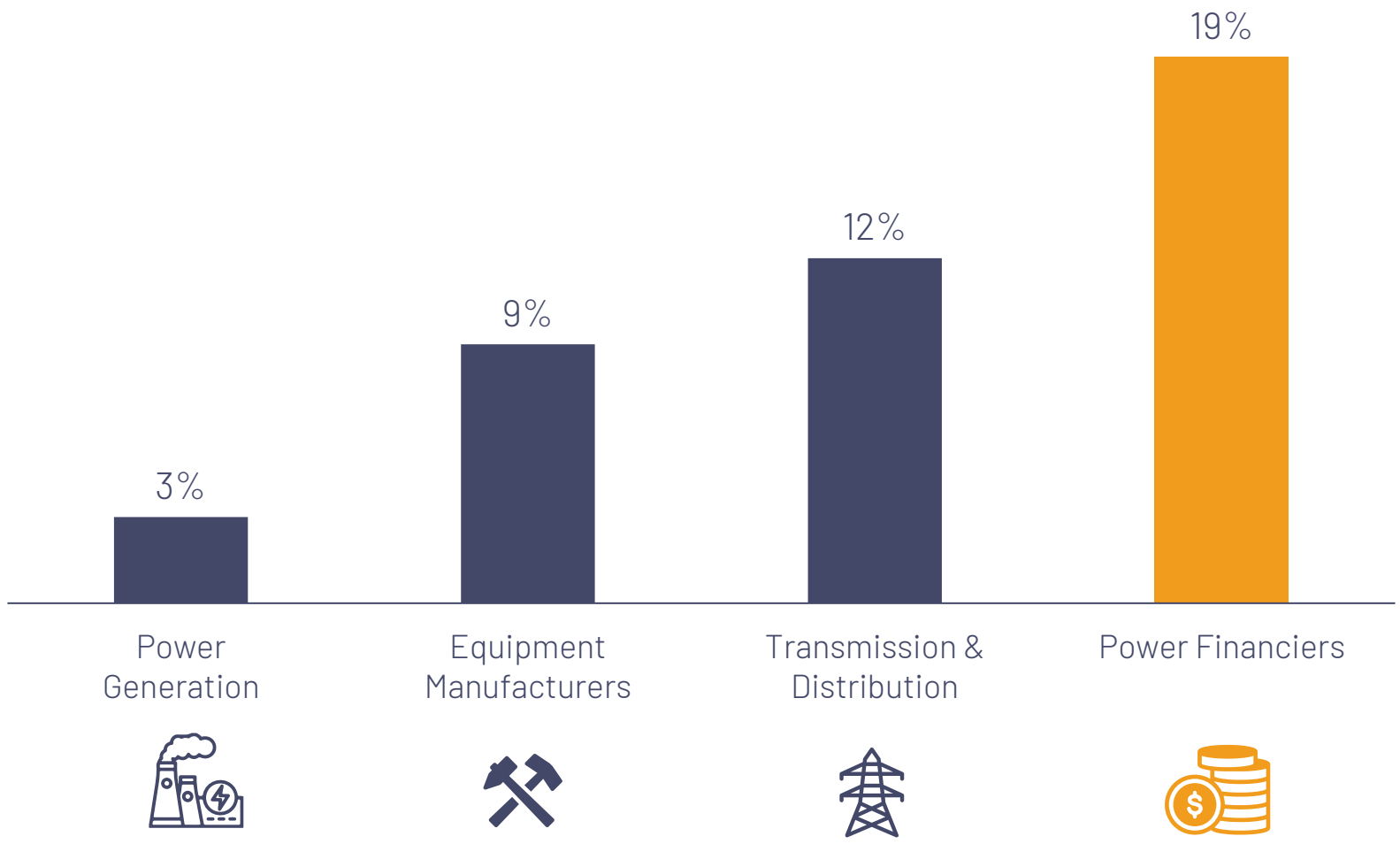
Who Benefits?

Powering The Power Cycle - Where the Profits Are

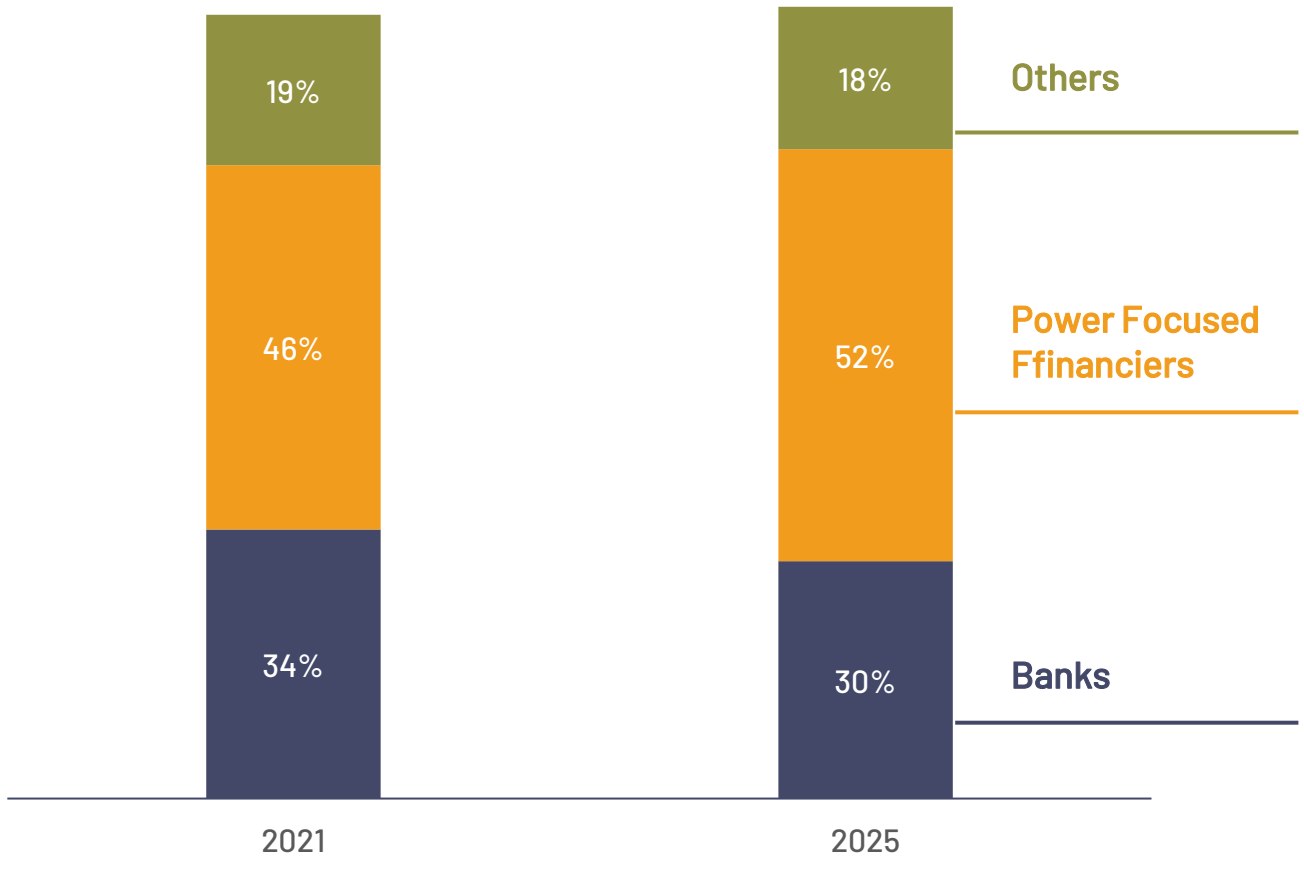
Power Financiers Deliver The Highest Through-Cycle Profitability In The Power Value Chain
(Average RoE Last 15Y)



Note: The provided average ROE are based on the performance of leading companies across different subsegments
Source: Ace Equity, Company filings, ICR

Who Finances The Power Boom?

Indian Power Sector – Financing Sources By Category



Specialized financiers dominate India's power project funding

The long duration of most power projects makes them difficult for banks to finance, as banks rely on shorter-tenor and often unpredictable deposits.

Power financiers, with longer-dated capital market borrowings, are better able to match the duration of assets and liabilities, allowing them to extend long-term loans that align with project cash flows.

Power financiers also bring deeper technical expertise and a holistic view of the sector. The viability of a power project often depends not just on execution but also on the broader infrastructure around it — for example, a renewable project's success hinges as much on available T&D capacity to evacuate power as on the project's generation efficiency.

Note: Periods refer to Indian financial years between April and March. For instance, 2025 represents the period from April 2024 to March 2025; Others include capital market issuances, foreign currency borrowings among others.
Source: CareEdge Ratings

Power Financiers – Dramatically Increasing Addressable Market

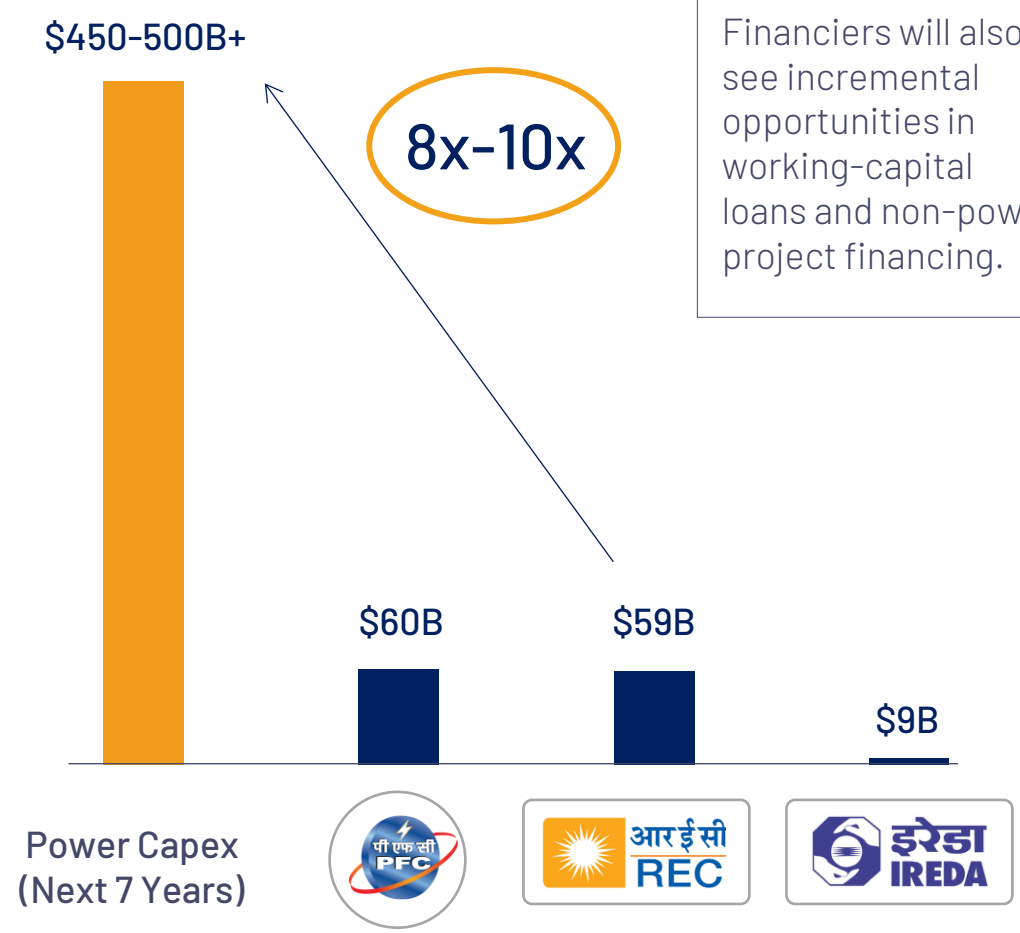
Power Capex Is Set to Accelerate...

2.5x

Increase in power capex over the next 5 years (vs. the last 5)

...Creating a Significantly Larger Financing Opportunity

Expected Power Capex vs. Current Loan Books of Power Financiers



Financiers will also see incremental opportunities in working-capital loans and non-power project financing.

Source: Jefferies, Ministry Of Power – Government Of India, Company filings, ICR

Power Financiers Benefit First (And Most Reliably)

Time Before First Earnings / Cashflow

Financiers start earning right after loan disbursement, while generation and transmission assets produce cash flows only after commissioning — usually several years after the initial investment. Financiers also face fewer operational risks than developers, who are exposed to delays, competition, fuel/price volatility, and oversupply, all of which create uncertainty around returns.

Source: ICR

India’s Power Financiers

Key Metrics	आर ई सी REC	पी एफ सी PFC	इरेडा IREDA
Inception	1969	1986	1987
Loan Book *(USD B)*	$66B	$64B	$10B
Net Non Performing Assets *(%)*	0.2%	0.4%	2.0%
RoE *(%)*	22%	21%	18%

Source: Company filings, ICR

India – Stronger Growth, Not Yet Rerated

Projections - 2025 to 2030E

Key Metrics			India Over US
Incremental Power Demand (TWh)	626	817	+192 TWh
Power Demand Growth (%)	14%	40%	+26 %
Data Center Expansion (x)	3x	5x	+2x
Power Capex Vs. Last 5Y (x)	1.7x	2.5x	+0.8x
Utility Sector Rerating (P/B)	+104%	???	

In the US, utilities rerated once growth expectations reset. India's growth profile is stronger, but its large power financiers (REC and PFC) still trade at ~1× P/B and <6× P/E

Note: Rerating calculated based on the average of Goldman Sachs Power Up America Index and Morgan Stanley AI-focused power names
Source: Bloomberg, Morgan Stanley, Goldman Sachs, Jefferies, Ministry Of Power – Government Of India,

And Finally, India's Great Data Homecoming

Local Data = Local Data Centers

2018

Mandate that all payment data be stored domestically

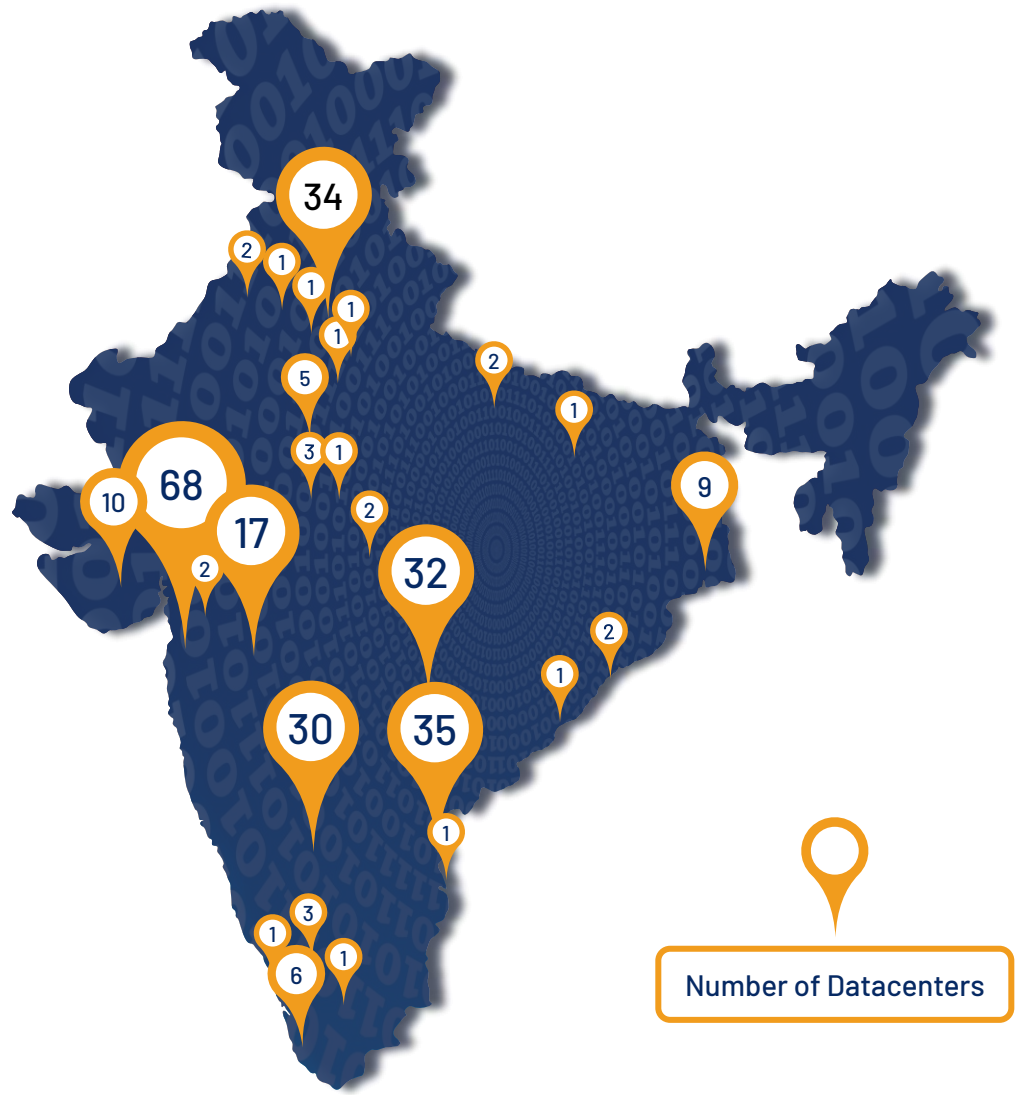
2023

All stock exchange data required to be stored domestically

2023-25

Government gains new authority to restrict cross-border data transfers

India's Data Center Build



Source: Spark Capital, Data Center Map