Supplement

Powering India's Data Centre Growth with Geothermal Energy and Cooling

Investors have committed tens of billions of dollars to build new AI-driven data processing centres in India. Fortunately, the nation has significant geothermal resources that can be deployed to safely and securely meet the incoming demand for data centre power and cooling—and alleviate the intense pressure these centres will put on the national grid.

India's data centre sector is growing exponentially as cloud adoption, 5G expansion, streaming, e-commerce, and hyperscale artificial intelligence (AI) workloads drive demand for intensive data processing. In late 2025, a number of U.S. technology giants announced major investments in data centres and AI infrastructure in India, including Amazon (US$ 35 billion[1]), Microsoft (US$ 17 billion[2]), and Google (US$15 billion).[3] These investments are in addition to those made by major Indian companies such as Reliance (US$ 110 billion) and the Adani Group (US$ 100 billion).[4] India has clearly moved from being a fast-growing digital market to a global-scale platform.

These trends may accelerate given that India mandates certain categories of information such as payment-system data are stored locally. The country also requires localisation and sovereign-access requirements across financial services, telecommunication networks, government cloud infrastructure, cybersecurity logging, and more.[5] Beyond policy, physics matters: AI and high-volume services are sensitive to latency, and delays of even milliseconds can compound. Until recently, much of India's data was stored on servers abroad, increasing both latency and dependence on technology out of the nation's control. All of these factors intensified India's need and drive for local servers.

HOW TO POWER AND COOL THE COMING DATA CENTRES

A 2024 analysis estimated that India would add roughly 464 megawatts of new co-location capacity per

CURRENT DATA CENTRES AND GEOTHERMAL ELECTRICITY-GENERATION POTENTIAL

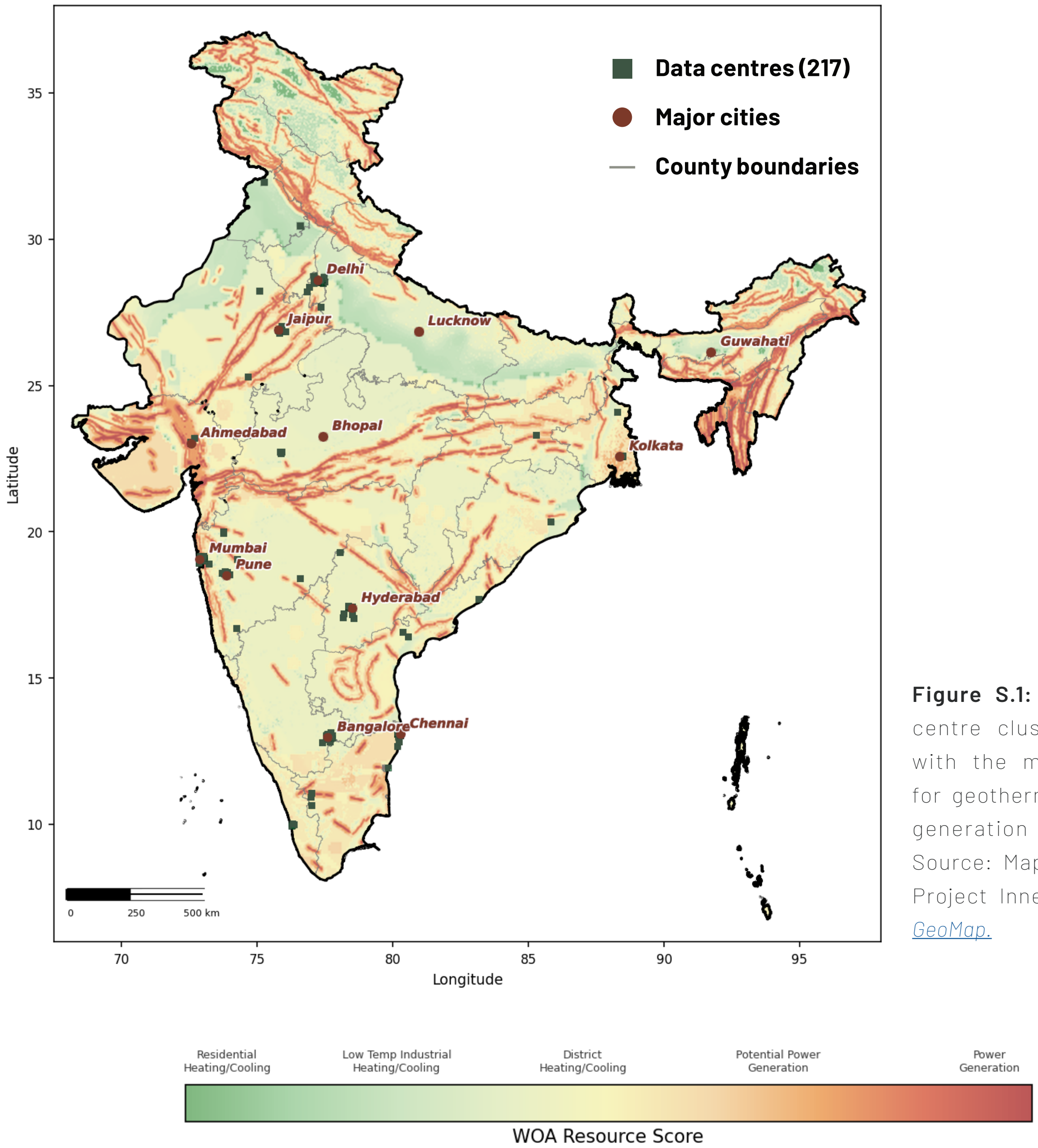


Figure S.1: Current data centre clusters in India with the most potential for geothermal electricity generation and cooling. Source: Map produced by Project InnerSpace (n.d.). *GeoMap.*

year until 2028—and that the installed co-location information technology (IT) load was 977 megawatts.[6] That estimate shows there will be a large near-term concentration in the main hubs, most notably Mumbai (about 301 megawatts under construction and about 916 megawatts planned), Chennai (about 182 megawatts under construction and close to 152 megawatts planned), Delhi National Capital Region (109 megawatts under construction and approximately 139 megawatts planned), and Hyderabad (an estimated 36 megawatts under construction and 55 megawatts planned).[7]

The key question is, How will these data centres be powered and cooled in a way that does not compound peak grid demand? Geothermal offers two complementary pathways: (i) behind-the-meter geothermal power, which offers firm and secure electricity at the source; and (ii) geothermal direct-use cooling, which lowers the cooling penalty.

Behind-the-Meter Geothermal Power

Co-locating new data centres with geothermal resources can provide dependable baseload power without relying exclusively on grid availability or the carbon intensity of marginal generation. This model is particularly compelling where there are high-temperature resources or where next-generation systems can economically access subsurface heat. While a project's economics will vary by location and drilling cost, reservoir productivity, and local tariffs, the value is consistent: Geothermal can deliver 24/7 power for the 24/7 demand of a data-processing centre. Behind-the-meter geothermal serves as the primary power source, while grid connection through distribution companies provides the N+1 or N+2 redundancy (that is, one or two additional backup power sources beyond operational needs) that data centre reliability standards require.

Data centres do not draw power at a flat rate; they experience significant spikes throughout operation as workloads shift. Geothermal's firm baseload output is therefore most effective when paired with complementary flexible resources, including energy storage systems, grid interconnection, and demand-shaping algorithms that smooth consumption peaks. This pairing allows geothermal to anchor a data centre's power supply while flexible resources absorb variability.

Geothermal lead times are falling fast—and are already shorter than nuclear and, in some cases, gas. Fervo Energy drilled a well to 4,800 metres (15,765 feet) in just 16 days in 2025 as part of its 500 megawatt Cape Station project, a 79% reduction from the U.S. Department of Energy's baseline for ultra-deep geothermal wells.[8]

What's more, the latest hyperscale investments make geothermal even more valuable. As data centres scale to need hundreds of megawatts (and gigawatts),[9] the cost of instability rises—both for operators and for the grid. In places where governments and utilities can offer large, dedicated blocks of "industrial-scale" electricity (hundreds of megawatts of firm capacity, with the grid connections and reliability guarantees to match), operators have a strong incentive to lock in long-term contracts for power that is dependable and aligned with decarbonisation goals.

Geothermal Direct-Use Cooling

Geothermal is not only a source for electricity generation. Subsurface temperatures and groundwater systems such as aquifers can also support cooling for large sites, either by acting as a stable place to sink heat or by developing thermal storage systems that help reduce demand at peak load.

Data centres devote a significant share of their total energy use to keep servers cool—in other words, rejecting heat. That need will rise as AI processing demands climb. As a result, when it comes to choosing locations for new data centres, cooling infrastructure may become a decisive factor, especially in hot climates, dense cities, and regions with stressed grids.

In many situations, direct-use cooling can offset a substantial portion of a facility's energy consumption that would otherwise be dedicated to powering chillers, pumps, and heat rejection equipment—reducing the draw on the grid and improving resilience during extreme heat or when there are supply constraints.[10]

Take, for example, the Iron Mountain Data Center in Boyers, Pennsylvania, in the United States. The owners installed a geothermal cooling system that resulted in the facility using about 34% less energy for cooling infrastructure processes.[11,12] In other words, less power is spent moving heat out of the building and more is available for servers, allowing a data centre to deliver more computing power with the same grid connection. That efficiency gain is especially valuable when power is constrained, which helps operators maximise limited capacity and eases pressure created by long wait times for new generation and grid upgrades.

In addition to large data centre cooling, India's edge data centre network—smaller, distributed facilities located closer to end users to reduce latency and support local data processing—offers a strong use-case for geothermal cooling solutions such as ground source heat pumps. Highly distributed across more than 60 cities—with facilities strategically located in major metropolitan areas such as Mumbai, Chennai, and Bengaluru, as well as a wide range of smaller cities such as Jaipur and Guwahati—these edge data centres support 5G and low-latency services close to end users. These smaller, telecom-linked facilities typically rely on municipal water and conventional air- or water-cooled systems, creating sustainability challenges in water-stressed regions. Closed-loop borehole heat-exchange systems offer a promising alternative, particularly for small- to mid-scale edge sites (that need anywhere from hundreds of kilowatts to a few megawatts). These systems provide stable, water-free cooling and align well with the distributed nature of edge infrastructure. In India's hotter climates and dense urban environments, they are most viable as part of hybrid systems—combined with dry coolers or heat pumps—rather than as stand-alone solutions, with up-front costs and limited local geothermal supply chains remaining key barriers to adoption.

INDIA'S ADVANTAGE: THOUSANDS OF GIGAWATTS OF TECHNICAL GEOTHERMAL POTENTIAL

India is unusually well positioned to use geothermal for digital infrastructure because its resources are broad and geologically diverse, yet those resources are still largely untapped. As explained in Chapter 2, "Where Is the Heat? Exploring India's Subsurface Geology," researchers estimate that India has the technical potential for roughly 450 gigawatts of electricity generation (down to 5 kilometres) today and technical potential for more than 8,000 gigawatts of electricity (down to 7 kilometres) as technology improves in the future. Additionally, the country has more than 1,500 gigawatts of geothermal cooling potential. More than 300 thermal springs show evidence of deeper hydrothermal systems, concentrated along mobile belts, rift zones, and major suture zones—exactly the kinds of structural settings that allow for permeability and the transfer of heat.

Chapter 2 also classifies India's geothermal potential by application type, separating zones suitable for (i) high-temperature electricity generation, (ii) potential electricity generation, (iii) direct use and direct heating, (iv) low-temperature industrial heating and cooling, and (v) geothermal heating and cooling. This classification matters for data centres because the sector can benefit from both electricity and direct cooling.

The result is striking: More than one-quarter of India shows potential for a mix of geothermal electricity, direct-use, and cooling applications. Importantly, analysis shows that there is significant potential for geothermally powered data centres in Mumbai and New Delhi (**Figure S.3**). Geothermal offers India a rare two-for-one advantage: always-on power and direct-use geothermal cooling (**Figure S.4**) that can materially reduce electricity draw.

TOTAL AQUIFER COOLING POTENTIAL BY INDIAN STATE (IN GIGAWATTS)

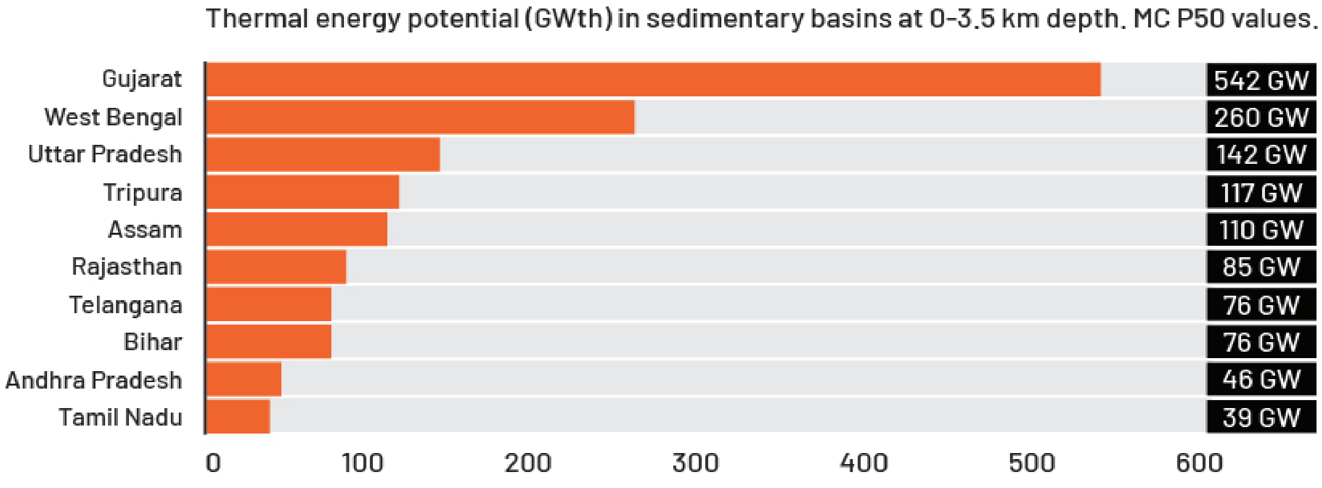


Figure S.2: Total aquifer cooling potential by Indian state in gigawatts (3,500 metres depth). Gujarat, West Bengal, Uttar Pradesh, and Tripura emerge as the leading states. Error bars show P10–P90 range. Source: Project InnerSpace analysis, 2025.

KEY GEOTHERMAL POTENTIAL OF INDIA BY DISTRICT

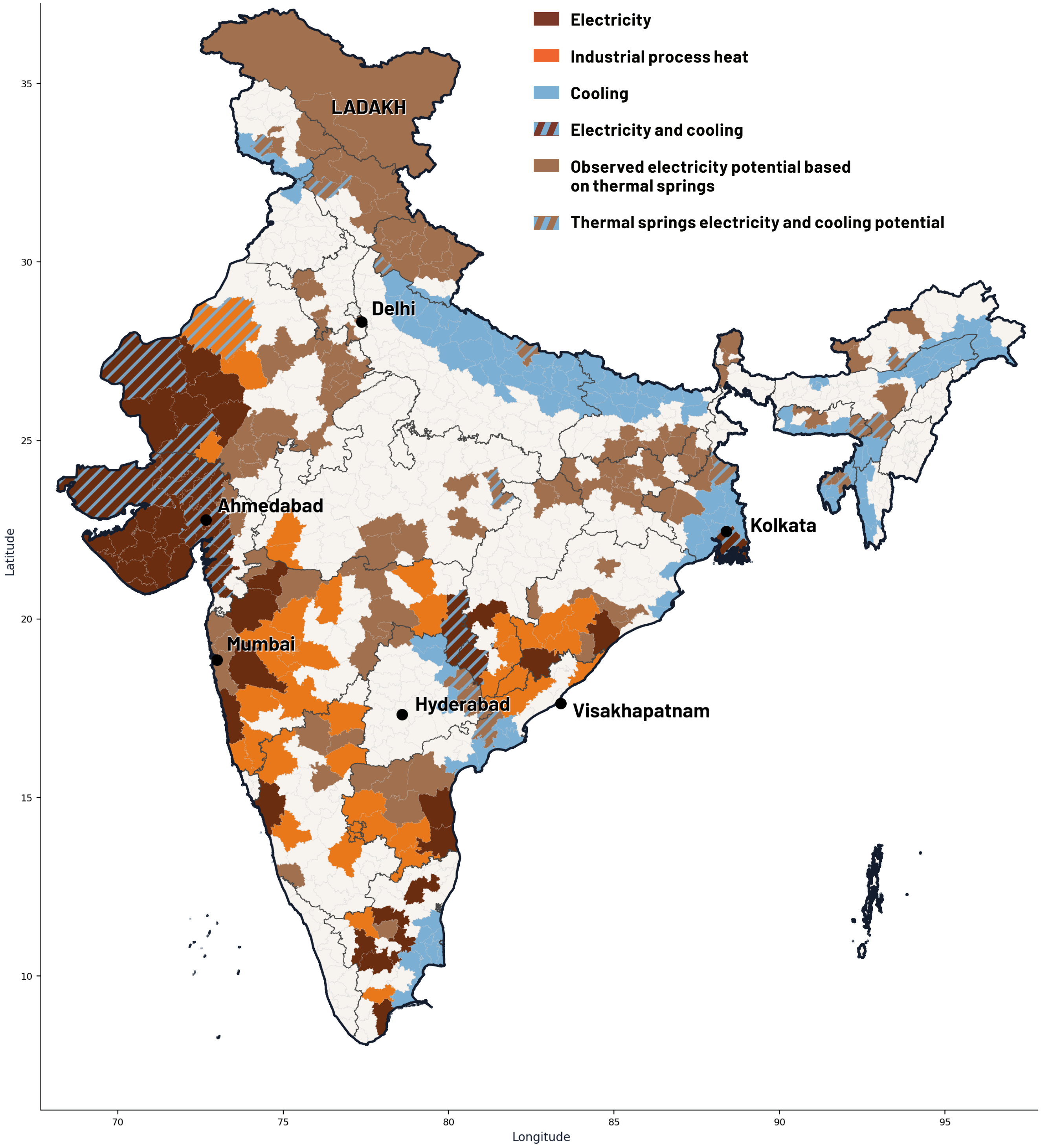
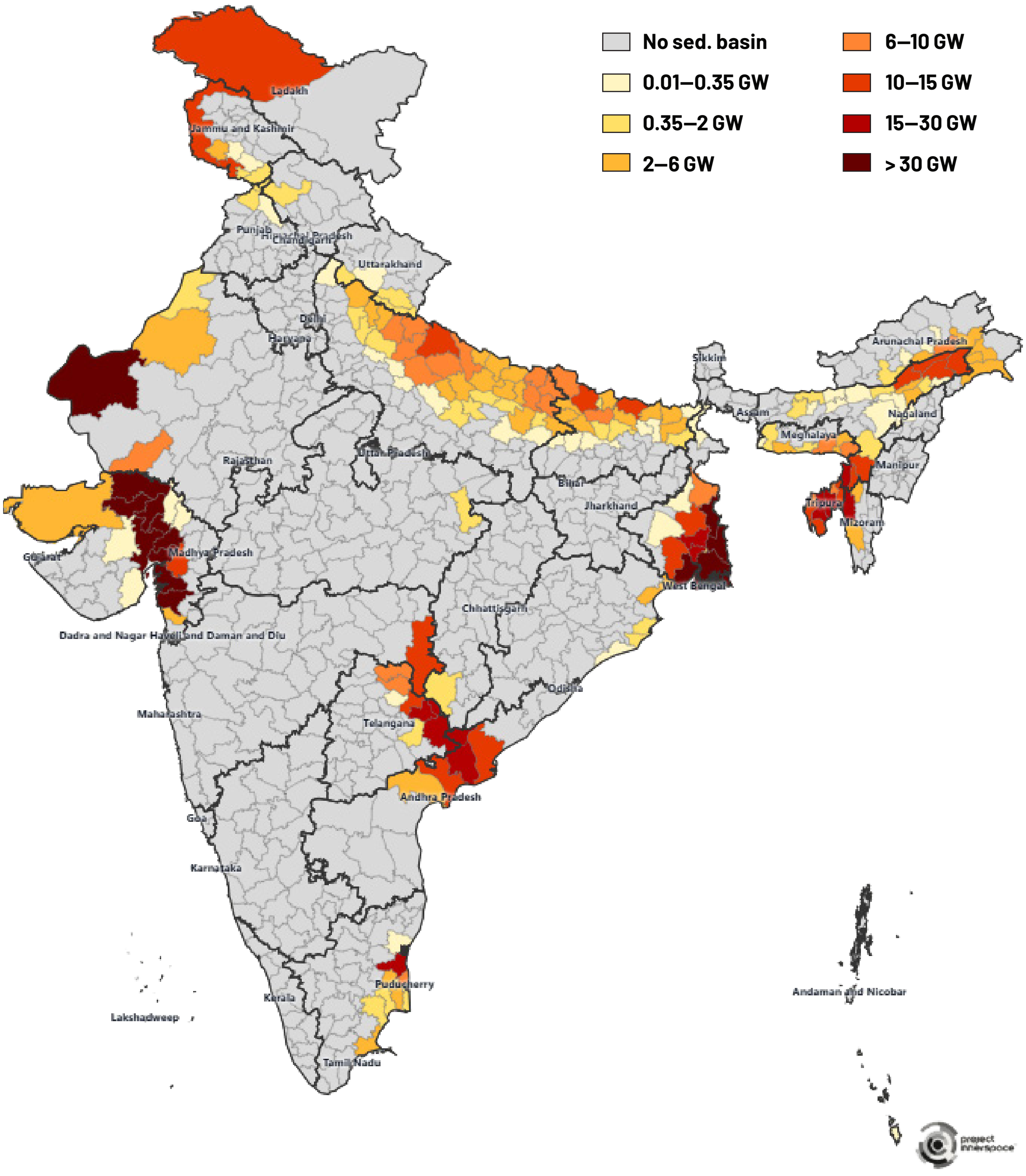


Figure S.3: Key geothermal potential of India by district. This map classifies India's districts by their geothermal potential and primary application based on the Project InnerSpace Heat in Place (HIP) volumetric model and the Global Advection Database. Observed electricity potential is derived from thermal springs information and is not modelled. Source: Project InnerSpace HIP analysis and advection database, 2026.

GEOTHERMAL COOLING GIGAWATT POTENTIAL PER DISTRICT AT 3,500 METRES DEPTH



STATES WITH POTENTIAL	TOTAL THERMAL POTENTIAL	MEAN PER STATE	TOP STATE
25	**1.6 TW**	**65 GW**	**Gujarat**
of 36 total	GWth (≥90°C, sed only)	GWth (states with potential)	542 GWth

Figure S.4: Geothermal cooling and storage potential in gigawatts (GW) per district at 3,500 metres depth. This map shows the GW potential per pixel at approximately 10 square kilometres per district, with the highest resource zones aligned with the semi-arid basins of Gujarat, West Bengal, Tripura, parts of Uttar Pradesh, Bihar, Telangana, and peninsular Andhra Pradesh. Source: Project InnerSpace analysis, 2026.

DIGGING DEEPER: MATCHING GEOTHERMAL RESOURCES WITH DIGITAL CORRIDORS

India's geothermal resources are distributed across several states and territories. For data centre power, the key is matching the best geothermal resources with today's digital infrastructure clusters—and those of the future.

Near-Term Opportunities

The Mumbai–Maharashtra corridor presents the most compelling immediate opportunity for integrating geothermal energy into India's data centre infrastructure. This region, which hosts the country's largest concentration of data centre facilities, coincides with a substantial zone of moderate to high geothermal potential within the Cambay Basin, extending inland from the coast. The presence of thermal springs throughout the greater Gujarat and Maharashtra areas further validates the subsurface potential in this area. Given that Mumbai accounts for more than 40% of India's operational data centre capacity and has more than 1,000 megawatts of planned expansion, the potential to leverage geothermal energy for baseload power or direct cooling applications represents a significant opportunity for sustainable infrastructure development.[13]

Similarly, the Hyderabad region and extended Telangana within the Godavari rift demonstrates notable overlap between emerging data centre development and geothermal resources that could support the region's projected 44% compound annual growth in data centre capacity through 2030.[14]

Untapped Potential: High-Resource Zones Without Data Centre Development

Central India: Son-Narmada Fault Zone

The Son-Narmada-Tapi (SONATA) lineament belt in central India, including the Tattapani Geothermal Field, represents another zone of high geothermal potential with limited current data centre presence.

Himalayan Region

India's first utility-scale geothermal project is currently in development in the Puga Valley, Ladakh. While the Himalayan region's remoteness limits near-term data centre development, the project will provide crucial operational experience and demonstrate the technical viability of geothermal electricity generation in India—knowledge that can be applied to more accessible locations as drilling technology improves.

Gujarat

The Kachchh rift, Cambay rift, and Saurashtra peninsula regions of Gujarat are all characterised as having high geothermal electricity-generation potential.

Andhra Pradesh

The Godavari rift system, which extends across Telangana and Andhra Pradesh, is characterised as having high geothermal potential. Combined with the state's subsea fiber optic cable landing infrastructure, Andhra Pradesh is a compelling candidate for early geothermal-powered data centre development beyond the established Mumbai and Delhi corridors.

GEOTHERMAL-READY INDIA: POLICY STEPS TO POWER AND COOL THE NEXT WAVE OF DATA CENTRES

Today, India's geothermal mapping makes it possible to move from "resource awareness" to bankable projects, but success will require policies that can enable the development and use of geothermal (see Chapter 8, "Policy and Regulatory Pathways to Catalyse Geothermal in India"). Particularly important will be rapid implementation of the Ministry of New and Renewable Energy's (MNRE's) 2025 National Policy on Geothermal Energy, which focuses on taking the risk out of early projects and establishing measures that create durable offtake (also known as demand-pull) for both electricity generation and cooling.

The immediate question is not whether India has enough subsurface resources for powering data centres with geothermal, but whether its policy and market architecture can convert those resources into deliverable, economically viable capacity at the pace needed for today's rapid data centre expansion. The following five steps translate the recommendations outlined in Chapter 8 into a practical, geothermal-ready checklist for data centre developers, state governments, and MNRE.

1. Prioritise pilot projects in high-alignment zones such as Gujarat–Maharashtra, Delhi–Haryana, the Godavari rift, and select hubs that pair data centre planning with early subsurface validation. These pilots should be treated as proof-of-concept deployments under MNRE's 2025 National Policy on Geothermal Energy—structured to build investor confidence, generate replicable technical templates, and populate state-level project pipelines.
2. Build on India's existing framework for behind-the-meter generation and private-wire supply. The Electricity Act, 2003, already permits consumers to lay dedicated lines without a licence, and having 9 gigawatts of behind-the-meter solar demonstrates that the model works at scale, which enables data centres to procure secure geothermal power directly where feasible. Regulatory frameworks should additionally enable revenue stacking alongside geothermal assets to manage load spikes. Procurement models should be evaluated against system-wide objectives, including reduced emissions, lower costs, improved reliability, and an equity principle that ensures dedicated industrial supply does not disadvantage other consumers, with a one-to-many configuration preferred where market conditions allow. This makes it simpler for large buyers such as hyperscale operators and co-location providers to procure secure, firm power via open access, whether through third-party or captive routes.
3. Establish resource rights and permit pathways for geothermal direct-use cooling, which often faces different regulatory questions than electricity generation. Geothermal sits between existing oil and gas, mining, land, and water statutes; without clear treatment of subsurface heat and streamlined permissions—including groundwater protection and reinjection norms—direct-use cooling will remain hard to finance even where it is technically attractive.
4. Invest and strengthen the availability of higher-resolution subsurface data, particularly from abandoned and existing oil wells for geothermal development (including heat flow measurements, magnetotelluric imaging, seismic tomography, and hydrochemistry) to reduce exploration risk and financing costs. This step is the practical backbone of the "de-risk investment" agenda detailed in Chapter 8: Having better data reduces uncertainty, enables bankable project reports, and makes incentives and tenders more effective by improving project selection and performance.
5. Treat water and cooling as co-equal constraints in siting policy. Hyperscale investment is inclined towards locations that can guarantee inputs at scale, so policy should evaluate geothermal cooling not only for energy savings but also for how it reduces peak stress and improves operational resilience in water- and heat-constrained regions. This area is also where a national geothermal cooling mission becomes directly relevant to digital infrastructure. If permitting, standards, and public sector pilots are designed to validate it at meaningful scale, geothermal can provide more than decarbonisation—it can enable resilience and a wider choice of building location.

CONCLUSION

India's data centre boom is being supercharged by the hyperscale deployment of AI. As a result, data centres face increased requirements and a practical need to keep latency low by storing and processing data closer to users. This combination means the demand for "always-on" electricity and cooling is being rapidly concentrated in a handful of corridors in India, particularly Mumbai, Delhi, Hyderabad, and Chennai. But this demand is happening just as grid stability, water stress, and heat resilience are becoming decisive constraints for where to locate a data centre.

Geothermal offers India firm, resilient power that matches the 24/7 need for data processing, as well as direct-use cooling that can materially reduce the cooling energy demand for data centres. If India deploys MNRE's framework, takes the risk out of early geothermal projects, and creates durable demand-pull for both electricity generation and cooling, geothermal could move from an underused resource to a productive and valuable piece of the country's digital infrastructure strategy. If implemented well, geothermal becomes more than a decarbonisation option: It helps India build more data processing power without compounding peak stress on the national electricity grid and builds a secure, more resilient foundation for the next wave of data-driven growth.

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