LEVERAGING TREATED WATER REUSE FOR SUSTAINABLE COOLING OF ARTIFICIAL INTELLIGENCE (AI) DATA CENTRES IN INDIA

A Discussion Paper

Neha Lakhwan[1] / Avanti Roy Basu[1]
Dr. Sonia Grover[1] / Dr. Girija Bharat[1]
Sh. Yugal Kishore Joshi[2]

[1] Mu Gamma Consultants Pvt. Ltd., India
[2] NITI Aayog, Government of India, India

September 2026

Acknowledgement

Mu Gamma Consultants is grateful to National Mission for Clean Ganga (NMCG) and GIZ India for the opportunity to work on Safe reuse of treated water and gain insights on using treated used water as a valuable resource for addressing water security issues in India

Discussion Paper

Leveraging Treated Water Reuse for Sustainable Cooling of Artificial Intelligence (AI) Data Centres in India

Authors

Neha Lakhwan
Research Scientist, Mu Gamma Consultants Pvt. Ltd.

Avanti Roy Basu
Director, Mu Gamma Consultants Pvt. Ltd.

Dr. Sonia Grover
Associate Director, Mu Gamma Consultants Pvt. Ltd.

Dr. Girija Bharat
Managing Director, Mu Gamma Consultants Pvt. Ltd.

Yugal Kishore Joshi
Programme Director – Drinking Water & Sanitation, School Education, Tourism & Culture, Water & Land Resources, Youth Affairs & Sports. NITI Aayog

Suggested Citation

Lakhwan, N., Roy Basu, A., Grover, S., Bharat, G., & Joshi, Y. K. (2026). *Leveraging Treated Water Reuse for Sustainable Cooling of Artificial Intelligence (AI) Data Centres in India.* Discussion Paper. Mu Gamma Consultants Pvt. Ltd., New Delhi, India. September 2026.

Publication: September 2026
Document Type: Discussion Paper
Publisher: Mu Gamma Consultants Pvt. Ltd.

CONTENTS

Abbreviations

ABS	Alkyl Benzene Sulphonate
AI	Artificial Intelligence
AMRUT	Atal Mission for Rejuvenation and Urban Transformation
AWS	Amazon Web Services
BOD	Biochemical Oxygen Demand
BWSSB	Bangalore Water Supply and Sewerage Board
CEC	Contaminants of Emerging Concern
COC	Cycles of Concentration
CPCB	Central Pollution Control Board
CPHEEO	Central Public Health and Environmental Engineering Organisation
CSE	Centre for Science and Environment
DC	Data Centre
DPDP	Digital Personal Data Protection
EIA	Environmental Impact Assessment
FY	Financial Year
GBUA	Gross Built-Up Area
GW	Gigawatt
HPC	High-Performance Computing
IBT	Increasing Block Tariff
IEA	International Energy Agency
ITES	Information Technology Enabled Services
IoT	Internet of Things
KIADB	Karnataka Industrial Areas Development Board
LCA	Life Cycle Assessment
LLM	Large Language Model
MAHAGENCO	Maharashtra State Power Generation Company Limited
MBR	Membrane Bioreactor

MLD	Million Litres per Day
MW	Megawatt
MeitY	Ministry of Electronics and Information Technology
MoEFCC	Ministry of Environment, Forest and Climate Change
MoU	Memorandum of Understanding
NCR	National Capital Region
NITI Aayog	National Institution for Transforming India
NMCG	National Mission for Clean Ganga
PIB	Press Information Bureau
PPP	Public-Private Partnership
PSA	Principal Scientific Adviser
RO	Reverse Osmosis
SEAC	State Expert Appraisal Committee
SEACC	State Expert Appraisal Committee
SEIAA	State Environment Impact Assessment Authority
SPCB	State Pollution Control Board
SRTW	Safe Reuse of Treated Water
STP	Sewage Treatment Plant
TDS	Total Dissolved Solids
TPP	Thermal Power Plant
TSS	Total Suspended Solids
TTRO	Tertiary Treated Reverse Osmosis
TUW	Treated Used Water
UF	Ultrafiltration
ULB	Urban Local Body
UNESCO	United Nations Educational, Scientific and Cultural Organization
USD	United States Dollar
USEPA	United States Environmental Protection Agency
WUE	Water Use Efficiency

LEVERAGING TREATED WATER REUSE FOR SUSTAINABLE COOLING OF ARTIFICIAL INTELLIGENCE (AI) DATA CENTRES IN INDIA

1. Introduction

As India accelerates its trajectory toward becoming a developed nation, it simultaneously grapples with a persistent and deepening water crisis. Competing demands across sectors, longstanding inter-state river disputes, and critically low flows during peak demand seasons have made water a flashpoint for mounting tensions across the country.

Against this backdrop, India is now positioning itself ambitiously as the next global data centre hub. Data centres are notoriously water-intensive, and the surge in AI computing has compounded the problem further, generating vast amounts of heat that demand large-scale water-based cooling infrastructure. Scientists have long been warning about what many now call “global water bankruptcy”, a slow-moving crisis driven by the convergence of rising industrial demand, growing human consumption, and the escalating disruptions of climate change. Water stress, already at critical levels across vast swathes of the planet, stretches further with each passing year. Into this precarious equation enters the exponentially growing appetite of data centres — infrastructure that, without deliberate intervention and viable alternatives, threatens to push already strained water systems beyond their limits.

We stand at a critical crossroads, one where the imperatives of water security and economic growth are no longer parallel pursuits but deeply intertwined ones. Striking the right balance is not merely a policy choice; it is an existential necessity. Progress that depletes the very resources it depends upon is not sustainable growth; it is deferred decline. Any developmental agenda that tips the scale too far in favour of economic expansion risks undermining the very ecological and social foundations that make such growth possible. Conversely, an overly cautious approach that stifles investment in the name of conservation could leave India trailing in a rapidly evolving global economy.

Therefore, as we try to balance the scale, the alternative that demands urgent deliberation and, more critically, decisive action is the use of treated used water for cooling towers in data centres. Rather than drawing from already overstretched freshwater reserves, data centres can and must pivot to treated used water as a viable and responsible cooling solution.

India is rapidly expanding its data centre network and Mumbai, Chennai, Navi Mumbai, Hyderabad, Bengaluru, Noida and Jamnagar continue to emerge as the key hubs driving data centre demand in India (PIB, 2026). This long-term growth must rely on the sustainability of natural resources, skilled human resources, and financial stability.

Data centres primarily employ two cooling strategies: air cooling and evaporative cooling. Air cooling consumes significantly higher electricity than evaporative cooling, making it less efficient at scale (Shehabi et al., 2016). Evaporative cooling is therefore emerging as the preferred approach for large-scale facilities (Mytton, 2021). This preference comes with a hidden cost: it Makes data centres fundamentally water intensive. One of the long-term challenges to the growth of data centres is that many of the cities deploying them are already experiencing water stress and are moving perilously close to absolute water scarcity, according to NITI Aayog's analysis of per capita water availability across Indian regions (NITI Aayog, 2026).

Using treated used water for cooling applications can significantly reduce dependence on potable water resources. Achieving this transition requires examining the existing policy and regulatory framework, available technological solutions, and lessons from national and international case studies where treated used water has been successfully utilised for cooling purposes. It is also important to assess the current status of treated water reuse in India and identify key barriers and opportunities. Based on this assessment, enabling pathways can be proposed to support data centre operators, utilities, and government agencies in effectively planning, implementing, and scaling the use of treated used water for cooling applications.

2. India's Digital Growth & Resource Implications

2.1 Expansion of AI data centres under Digital India

India is experiencing rapid growth in AI data centres, driven by accelerating digitalisation, expanding cloud infrastructure, and the increasing adoption of generative AI technologies. The installed capacity of 960 MW in 2025 is estimated to reach 9.2 GW by 2030 (PIB, Government of India, 2026). India's AI hubs concentrate in cities like Mumbai, Chennai, Noida, and Hyderabad, with major future investments from Google ($15B for 2026-2030) and the Adani Group ($100B by 2035), which will also contribute to India's Viksit Bharat 2047 vision (Google Cloud, 2026; PRNewswire, 2026). Key AI data centre players include AdaniConneX (Chennai), Google (Visakhapatnam), CtrlS (Hyderabad), Yotta NM1 (Navi Mumbai), NTT Global Data Centers (Chennai), Reliance Jio (Mumbai), and Chhattisgarh AI Park (Naya Raipur) (RCR Wireless, 2025; Google Cloud, 2026).

The AI Mission of Ministry of Electronics and Information Technology (MeitY) of India seeks to use transformative technologies to promote social impact adoption, inclusion, and innovation based on seven key pillars (AI Impact Summit, 2026):

1. India AI Compute Capacity: Enhancing computational power
2. AI Kosh Platform: Central AI data repository
3. India AI Future Skills: Building AI-ready human capital
4. Safe & Trusted AI: Ethical and secure AI use
5. India AI Innovation Centre: Fostering research & collaboration
6. India AI Application Development Initiatives: Sectoral AI solutions
7. India AI Startup Financing: Funding and global support for AI start-ups

With only 3% of the global data centre capacity, India hosts 20% of the world's data centres (Deloitte, 2025), comprising 271 data centres (as of January 2026) that occupy 23 million square metres of land (Tripathi et al., 2026). **Figure 1** shows a map of India's data centre hubs. Owing to its extensive subsea cable network and enabling policy environment, Mumbai and Navi Mumbai are the biggest AI hubs in the country, making up more than 25% of live capacity, followed by Chennai. Hyperscaler data centres in these coastal cities (Mumbai and Chennai) leverage seawater cooling (Tripathi et al., 2026) and thus have undersea cable connectivity. Hyderabad and Bengaluru each account for about 22% of the market. Pune and Kolkata provide 6% and 3%, respectively, while the Delhi NCR region (New Delhi, Noida, and Gurugram) makes up over 14% (PSA Government of India, 2025).

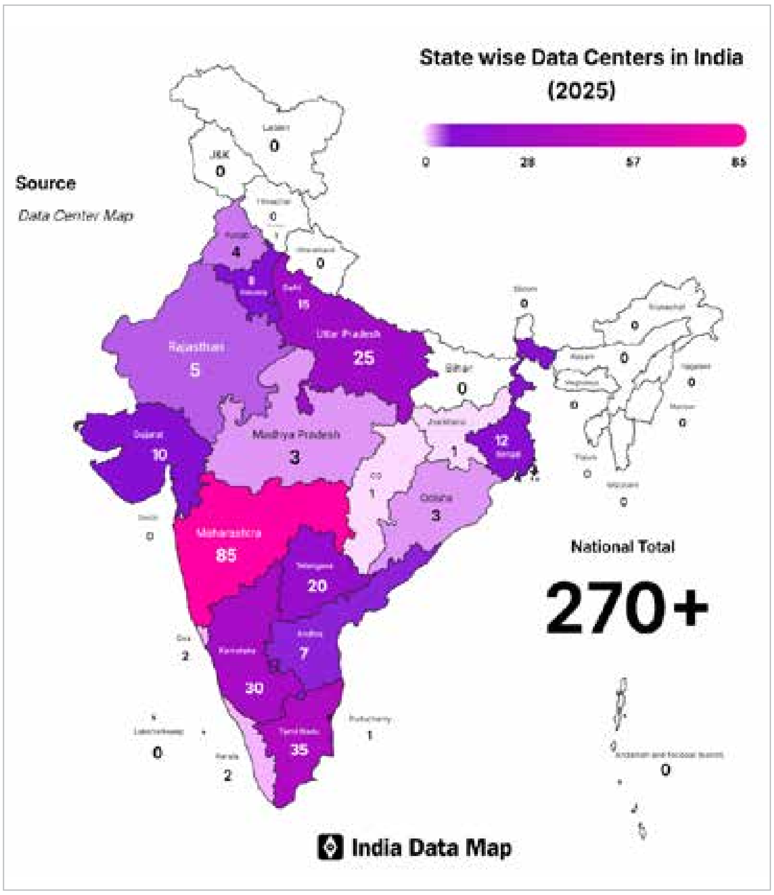

Figure 1: Map showing Data Centres of India (2025) (Sutariya, 2025)

2.2 Water-energy footprint of digital infrastructure

Data centres require large amounts of water and energy resources for advanced cooling solutions to maintain operational stability and efficiency, which can pose significant challenges. In 2024, data centres accounted for around 0.5% of national electricity consumption and around 1.5% of global electricity consumption, which is predicted to double to 3% by 2030 (Tripathi et al., 2026). Similarly, AI centres demand approximately 150 billion litres of water, which is expected to double by 2030. Small-scale data centre operators (of less than 5MW capacity) depend on municipal water supply for cooling (Tripathi et al., 2026). On the other hand, cooling a 100-MW hyperscale facility can require about 2 million litres of water daily (IEA, 2025).

Also, it must be noted that scaling AI data centres may require 45-50 million square feet of additional land by 2030 (PSA Government of India, 2025), highlighting the need to integrate sustainability principles with future expansion plans.

To support the rapid expansion of data centres and high-performance computing (HPC) clusters, power and cooling infrastructure must transition toward cooling systems that are efficient in both energy use and water consumption. The policy environment of India supports its AI infrastructure: the Digital Personal Data Protection (DPDP) Act, 2023, at the national level, and state policies of Maharashtra, Tamil Nadu, Karnataka (and other states) that emphasis green energy and cooling infrastructure (PSA Government of India, 2025). However, the support is not holistic in terms of supporting sustainable cooling systems. To meet the water demand for cooling in AI data centres, India needs precise policy provisions and water use efficiency plans to ensure its sustainable sourcing and efficient use.

2.3 Link to India's digital sovereignty and high-water usage for data centre cooling

The concept of data sovereignty mandates data to be governed by the regulations of the country where it is generated or stored. Ensuring data sovereignty is crucial, as national data infrastructure must protect sensitive information. Any challenge related to efficient data storage can be detrimental, highlighting the need for resilient data centre infrastructure that can efficiently store, process, and manage information at scale.

Currently, India's digital sovereignty entails data localisation, cloud infrastructure growth, AI expansion, etc., which is driving massive growth in data centres across the country. Policies encouraging local data storage, developing India's AI ecosystem, the Digital India Programme and processing are increasing the demand for hyperscale computing facilities. However, the digital sovereignty agenda has certain environmental implications, especially in terms of water demand for data centre cooling. Most large data centres rely on water-intensive cooling systems, such as evaporative cooling towers or water-cooled chillers (Research and Markets, 2026), to maintain optimal temperatures for high-density computing infrastructure.

In 2024, the cooling market of India was valued at USD 2.1 billion and is expected to grow to USD 7.13 billion by 2030 (Research and Markets, 2026). As digital transformation accelerates across various sectors, including IT, telecom, and finance, the need to manage heat generated by increasingly powerful servers and equipment has become critical. Efficient cooling systems are essential for maintaining optimal performance, reducing energy consumption, and ensuring the reliability of data centres. Several Indian states like Rajasthan, Odisha, Karnataka, Tamil Nadu, and Andhra Pradesh have started to address the issue by integrating sustainability into policy design. For example, Rajasthan's 2025 policy proposes to integrate measures like treatment and recycling systems to increase supply and use of treated water, smart solutions/IoT for water and used water management, zero liquid discharge solutions, rainwater harvesting, and restoration of waterbodies within premises (if any) (Rajasthan Data Centre Policy, 2025).

3. Understanding Data Centre Water Demand

3.1 Cooling technologies and water demand in data centres

Efficient cooling systems are crucial for maintaining optimal performance and ensuring the sustainability of data centres. Liquid cooling and air-cooling systems are the two main types of cooling technologies (Research and Markets, 2026). Location, cost, operational efficiency, and customer needs determine the choice of cooling technologies.

Water-based cooling systems can be more energy-efficient than air cooling systems but are highly dependent on water supply. The volume of water needed for cooling depends on the size of the data centre, local climatic conditions, cooling technology used, and the data processing load (Tripathi et al., 2026). Large language models (LLMs) make several energy-intensive calculations, requiring liquid cooling systems (Yañez-Barnuevo. 2025). According to a University of California, Riverside study (Li et al., 2023), each 100-word AI prompt uses 519 millilitres of water, highlighting the cumulative global impact of AI usage.

Alternative technologies like direct-to-chip cooling, dielectric plate cooling, and immersion cooling can cut water and energy consumption (Tripathi et al., 2026). High costs, supply chain limitations, maintenance challenges, technical difficulty, and other factors hinder the adoption of liquid cooling or immersion cooling technologies. However, these systems can handle high thermal loads and operational demands. As a result, despite these constraints, India's data centre cooling market is gradually shifting towards liquid cooling systems for their efficient thermal management solutions.

Innovations are already emerging in this space. For instance, in 2024, Perstorp, part of the PETRONAS Chemicals Group Berhad, collaborated with Intel to develop an advanced synthetic thermal management fluid for immersion cooling applications in data centres (Research and Markets, 2026). Indian data companies, such as CtrlS, are increasingly adopting liquid cooling (and adiabatic cooling) systems while also leveraging AI-driven predictive maintenance and optimisation technologies to enhance operational efficiency (Deloitte, 2025).

3.2 Variability by size, location, and design

India's AI data centres can be divided into three categories: hyperscaler, enterprise, and colocation (Research and Markets, 2026). Hyperscaler data centres are the largest users of cooling systems, which cater to their needs for cloud computing expansion, big data analytics, and AI-driven applications. Their high-performance servers generate big thermal loads and require efficient cooling systems to ensure optimal performance and reliability. In comparison, enterprise and colocation data centres have less intensive cooling needs. Enterprise data centres, which cater to individual organisations, have specific and different cooling requirements based on their scale and operational needs, whereas colocation data centres offer shared infrastructure to multiple clients, requiring a different cooling dynamic (Research and Markets, 2026).

The geographic location of data centres is a key factor. Major data centre hubs in cities like Mumbai, Chennai, Hyderabad, and Bengaluru are supported by enabling factors such as strong digital infrastructure, availability of skilled human resources, reliable power supply, and proximity to undersea cable landing stations. However, many of these cities are also facing water stress driven by rapid urbanisation, industrialisation, and climate variability. As data centres depend on large volumes of water for cooling operations, their continued growth may put additional pressure on already constrained freshwater resources. The convergence of data centre growth and water scarcity highlights the need for integrating sustainable water management strategies, like the use of treated used water, into data centre operations.

3.3 Operational challenges of using surface/groundwater sources

Indian cities like Mumbai, Chennai, Hyderabad, and Bengaluru that have become prime data centre locations face severe water shortages. Bengaluru alone faces a deficit of 500 million litres against its daily requirement of 2,600 million litres, while a similar crisis is unfolding in Mumbai, Delhi, and Chennai (Deloitte, 2025). Nearly 75% of India's data centres already occupy water-stressed regions. Bengaluru's data centres are concentrated in its most water-stressed eastern and southeastern corridors. Hyderabad is projected to face a water deficit of 870 million litres per day by 2027. In 2019, Chennai hit Day Zero as its four main reservoirs fell below one per cent of capacity.

Water quality is also an issue. In several inland locations, reliance on groundwater or surface water sources for cooling may lead to operational challenges, such as scaling, corrosion, and the occurrence of pollutants and heavy metals, which can damage cooling systems and increase associated costs.

The use of treated used water (TUW) with controlled and standardised quality can be an effective cooling solution for data centres, as it reduces water quality risks and improves the efficiency of cooling systems. Used water can be treated to meet specific quality standards for intended reuse applications and can be sourced either through on-site treatment systems or through public-private partnerships, in which municipalities supply TUW to data centres.

4. Treated Used Water as an Alternative: What We Know

The case for treated used water as a cooling source for AI data centres is scientifically sound and is being practised in some instances (Data Centre Dynamics, 2024). However, the quality of treated water plays an instrumental role to ensure sustainable usage for cooling towers. Cooling towers are the primary water-consuming component of most data centres and are highly sensitive to water quality. Key water-quality parameters for cooling applications include Total Dissolved Solids (TDS), with acceptable concentrations depending on the cooling-tower design, water chemistry and cycles of concentration. Elevated TDS can increase the risk of scaling and corrosion and, together with other water-quality factors, can contribute to fouling, reducing heat-transfer efficiency and increasing maintenance requirements.

India has stepped up efforts to narrow its sewage treatment gap through targeted central missions. Under Namami Gange Phase II, per an August 2026 PIB update, the programme has created 4,263 MLD of sewage treatment capacity by June 2026, with a target of reaching 5,000 MLD capacity within the year, and by January 2026 it had commissioned 173 operational STPs with a cumulative capacity of 3,976 MLD, including 25 new plants adding 530 MLD during calendar year 2025 alone. Big-city projects have anchored this push. Asia's largest sewage treatment plant, the 564 MLD Okhla facility in Delhi, was commissioned in 2025, while Agra received two new STPs (31 MLD and 35 MLD) as part of ₹842 crore, 177.6 MLD project across 13 plants to cut untreated sewage flowing into the Yamuna, and Varanasi's 55 MLD Assi-BHU plant went operational to serve nearly 1.8 million people. Alongside river-focused missions, the broader AMRUT 2.0 scheme (running FY 2021-22 to FY 2025-26, outlay ₹2,99,000 crore) is targeting 100% sewerage and septage management coverage across the roughly 500 cities already covered under AMRUT 1.0, explicitly pushing a "circular economy of water" model where treated used water is reused rather than discharged.

With the National Framework on Safe Reuse of Treated Water, 2022 and state policies on the same, impetus is given to the reuse of treated water for the industrial sector. Additionally, the Ministry of Power's Tariff Policy 2016 makes it mandatory for Thermal Power Plants (TPPs) to use treated sewage water from municipal treatment plants located within a 50 km radius. TPPs are water-intensive units which need water mainly for cooling towers. Hence, treated water can legally find its way into various industrial processes; however, from a technical perspective, industrial reuse requires careful consideration of water quality requirements, treatment levels, process compatibility and end-use-specific standards. Treatment, quality, conveyance and reliability are also important aspects that ensure this policy translates into action. Examples do exist; the Yelahanka gas-based power plant in Karnataka sources about 15 million litres per day of tertiary treated used water from the Jakkur sewage treatment plant (STP) under this policy framework. This water is supplied by the Bangalore Water Supply and Sewerage Board (BWSSB) via dedicated pipelines from the Jakkur STP. In another example, a pilot project near Devanahalli delivers secondary treated used water to a Karnataka Industrial Areas Development Board (KIADB) tech park, where additional tertiary treatment is carried out on-site. These cases demonstrate that systems for conveying treated used water to industrial users are already in place and functioning (CSE Down to Earth, April 2026). Globally, this practice has gained more momentum, especially for data centres. Google uses reclaimed or non-potable water at over 25% of its data centre campuses (Google, 2022). Amazon is using reclaimed used water in its 16 data centres across Virginia and in Santa Clara, California.

One major challenge in using treated used water is assuring treated used water adheres to high-quality standards. The standard STP output, meant only for safe discharge, does not by itself meet cooling-system requirements, so an additional tertiary polishing step is needed. Conventional secondary treatment at Indian STPs may target discharge-quality parameters such as BOD ≤10 mg/L and TSS ≤10 mg/L; however, cooling-tower applications require additional control of dissolved solids and mineral constituents to minimise scaling, corrosion and fouling. TDS, pH, conductivity, hardness, chloride and silica are particularly important for assessing the suitability of treated water as cooling-tower make-up water. CPHEEO guidance demonstrates the importance of TDS by relating make-up water TDS to cycles of concentration: 500 mg/L corresponds to a COC of 6, 1,000 mg/L to 3.5, and 3,000 mg/L to 2. To bridge this gap, tertiary treatment is needed to reduce impurities and make water fit for use in the cooling tower. It's a multi-stage process and the most common advanced treatment pathway involves membrane bioreactors (MBR), ultrafiltration (UF), and reverse osmosis (RO). The right quality of water is an important input for cooling tower efficiency and sustainability. CPHEEO has provided the cooling water guidelines as presented in Table 01:

Table 1: CPHEEO Guidelines for cooling water

No	Parameter/Condition	Recommended Value
	(A) In make-up Water	
1	pH	6.8-7.0 (variation less than 0.6 units in 8 hrs)
2	Average TDS value (with variation +25% permissible on 8 hrs average)	Cycles of concentration in recirculating water
	3000 mg/l	2
	1000 mg/l	3.5
	500 mg/l	6
3	Oil & grease	Absent
4	BOD (5-day, 20° C)	Less than 5.0 mg/l
5	Chlorides (Cl)	Less than 175.0 mg/l
6	Ammonia	No appreciable amount
7	Caustic alkalinity	Absent
8	Methyl orange alkalinity	Less than 200mg/l
	(B) In recirculating water	
9	Silica	Less than 150 mg/l
10	Phosphates, sulphates	Not to exceed solubility limit in recirculating water
11	Alkly Benzene Sulponate (ABS)	Foam not to persist more than 1 minute after 10 seconds of vigrous shaking of recirculating water
12	Langelier index at skin temperature of heat exchange surface	0.50±.1
13	Ryzner Stability Index	6.0 to 7.0

Source: CPHEEO Manual on Sewerage and Sewage Treatment Systems - Part A: Engineering (Second Edition), 2012

Routine monitoring of TDS, pH, conductivity, pump and fan pressures, and microbial content detects issues early, and scheduled chemical treatment sustains reliability, prevents fouling and corrosion, and maintains optimal cooling capacity.

Even where treatment technology is in place, treated used water cannot simply replace freshwater without significant infrastructure investment. The challenge is not just producing the right quality water; it is delivering it reliably, at the right volume, at the right time, with adequate backup capacity. Data centres operate with 99.99% uptime requirements and cannot afford to interrupt the cooling process, even for a brief period. Thus, there is a need for storage that could ensure supply during all times. It also means a reliable supply of water of prescribed quality. Often, seasonal variation impacts both the quality and quantity of municipal used water, which can be challenging for the data centres. Quality concerns are addressed to some extent by setting up on-site polishing units which typically comprise RO or UF units to act as a buffer against incoming quality swings.

Treated used water reuse is not a universal solution, and its suitability varies considerably between hyperscale giants and the smaller, distributed facilities. Generally, the utility-treated water is more conducive for hyperscale centres, while for smaller units, it's not that feasible due to accessibility and infrastructure challenges. In such cases, on-site decentralised systems combined with RO/UF polishing offer a more feasible solution. Such facilities can be provided with incentives and/or subsidies for treating secondary-treated used water and making it fit for use in the cooling towers.

Globally, there are cases where the partnership between utilities and data centres has successfully demonstrated this alternative arrangement. Examples from the United States highlight the different water reuse approaches that have helped to meet the water quality and water quantity needs of AI data centres, which India can adopt.

- The City of Santa Clara, California, operates a recycled water network supplied by South Bay Water Recycling, which delivers recycled water as a cooling solution for data centres of companies such as Amazon Web Services (AWS). It also supports AWS's Water+ commitment to replenish more water than it consumes in direct operations by 2030 (WateReuse Association, n.d.).
- In Washington, Microsoft developed the Quincy Water Reuse Utility, which treats and recirculates cooling water used in Microsoft's data centres in Quincy. This initiative reduces dependence on local groundwater while providing improved-quality cooling water with lower mineral content. The recycled water helps prevent scaling and heat transfer inefficiencies caused by total dissolved solids present in local groundwater, thereby improving the performance and operational sustainability of the cooling system (USEPA, n.d., USEPA, 2025).

5. Economic & Environmental Considerations

The economic case for treated used water reuse is straightforward, yet it is rarely made with the rigour it deserves. In India, water is a state subject under the Constitution, and its political salience makes rational tariff design difficult. State governments often set water tariffs well below cost recovery levels, partly reflecting genuine concerns about affordability and access. This situation makes it structurally difficult to create the price differential that would otherwise make treated used water economically attractive to industrial users. This layering of political constraints over already intangible environmental returns makes the economic case for treated water reuse genuinely difficult to prosecute. Nevertheless, the assessment should also account for the long-term social, economic, and environmental benefits of substituting potable water with treated used water for non-potable applications, such as cooling in data centres.

A study by Del Rosario et al. (2025) shows that the life cycle assessment (LCA) of the used water reclamation and reuse scheme outperforms the conventional system, including a 33.6% reduction in global warming potential. However, techno-economic analysis reveals cost challenges largely driven by energy-intensive tertiary treatment technologies like RO and MBR. However, there are approaches to mitigate this cost by optimising operations, selecting appropriate technologies, and minimising sludge production. Gandiglio et al. (2017) presented the concept of energy-self-sufficient used water treatment plants to remediate energy demand issues, e.g., by recovering resources from the used water stream to provide process energy. These recommendations are in alignment with the circular economy principles that highlight optimal resource recovery by treating used water (UNESCO, 2020) and further harnessing the economic benefits that can be generated from its reuse.

Another important economic consideration is the type of technology used for cooling. Liquid cooling, as discussed earlier, is one of the most preferred cooling options (despite being more complex and expensive), which can be implemented in either a closed or open loop. Closed-loop cooling systems need a large volume of water to charge up but not continual supplies. An open loop needs continuous water to make up for water losses through evaporation, blowdown and drift losses. Open-loop cooling hence needs more treatment and is both water- and cost-intensive.

For treated water reuse to scale, price signals must be deliberate and well-designed. Three broad pricing models have demonstrated viability across different contexts.

The first is differential or a two-part tariff structure (fixed + variable charge). The fixed charge covers infrastructure and maintenance, and a volumetric charge is based on actual usage. Two-part tariffs are widely promoted by the World Bank and aim at recovering costs and achieving economic efficiency (Molinos-Senante et al., 2013).

The second is volumetric or increasing block tariffs (IBT) applied to freshwater consumption, which indirectly make treated water more attractive. Tiered water pricing, also known as increasing block tariffs, is a water management strategy where the price per unit of water increases significantly as the volume consumed rises across defined consumption thresholds (Sustainability Directory, 2025). This approach works for large industrial users which are water guzzlers and the relative economics of switching to reclaimed water improve substantially for them even if it means investment in infrastructure.

The third model involves subsidy and blended finance mechanisms, which in the Indian context means convergence with existing central and state schemes such as AMRUT and Data Centre Policies of states to provide the financial momentum to bridge the gap between treatment cost and commercially viable offtake pricing, particularly in the early years of a reuse programme.

Critically, no pricing model succeeds in isolation. It must sit within an enabling regulatory environment that mandates or strongly incentivises reuse for specific sectors and that is precisely what state-level safe reuse policies, such as those now in place for Uttar Pradesh and Uttarakhand, are designed to provide. Business models for reuse of treated water are very well explained in the solution document prepared for the city of Panipat, which focuses on creating a sustainable circular water economy by supplying treated used water to local industries (especially textiles), agriculture, and urban users (NMCG, 2023).

The economics of treated water reuse do not scale linearly, and the difference between large and small facilities is stark enough to warrant separate policy consideration. For large industrial consumers such as hyperscaler data centres, steel plants, and thermal power units, the investment case is relatively easier to make. High volumes translate into better economies of scale for on-site polishing infrastructure, lower per-unit treatment costs, and sufficient operational staff to manage water quality protocols. Closed-loop cooling systems incorporating used water recycling or rainwater harvesting have already shown freshwater savings of 50–70% where implemented (World Economic Forum, 2024). Large tech companies understand this and as reported by one of the tech giants, Amazon plans to use recycled water in over 120 data centres by 2030, saving an estimated 530 million gallons of fresh water per year (Amazon Sustainability, n.d.).

Perhaps the most compelling economic argument for treated water reuse is not the direct cost saving at all; it is the range of co-benefits that accrue to utilities, governments, and ecosystems simultaneously.

Used water treatment offers a double value proposition: in addition to environmental and health benefits, it can bring economic benefits through reuse across sectors. Its by-products, such as nutrients and biogas, can be used for agriculture and energy generation, and additional revenues generated from this process can help cover water utilities' operational and maintenance costs (World Bank, 2020). The economics of treated water reuse in data centres are stronger than they appear on the surface, but weaker than they need to be if pricing, subsidy design, and scale are not addressed with deliberate policy intent.

6. Policy, Institutional & Governance Landscape

6.1 Existing frameworks: SRTW policies, urban reuse guidelines

To fully harness the benefits of the AI boom, India must invest in the sustainable management of its water resources. Expanding the use of reclaimed water can help meet growing industrial demand while ensuring that potable water remains available for residents, without the two competing for the same resource. The *National Framework for the Safe Reuse of Treated Water* (SRTW) provides a foundational basis for a coherent policy for reusing treated water. The framework directs the system to prioritise Treated Used Water (TUW) allocation based on social, economic and environmental benefits. It also encourages the uptake of TUW through mandatory reuse requirements and quality assurance. Thus, the utilities must ensure high-quality service.

Similarly, under the new National Tariff Policy (Ministry of Power, 2016) issued by the Government of India, thermal power plants located within 50 km of the sewage treatment plant of the municipality, local body, or similar organisation shall mandatorily use treated sewage water produced by these bodies. These two policies provide guidance; a similar arrangement can be developed for data centres. The policy also suggests the thermal power plants have a backup source of water to meet their requirements in the event of a shortage of supply by the sewage treatment plant.

6.2 Roles of ULBs, utilities, regulators, and data centre operators

For effective implementation of TUW, it is essential for water utilities to learn best practices for TUW and comply with the water quality standards needed for using TUW for data centre cooling. It is necessary to use existing regulatory mechanisms or develop new policy, regulatory incentives and penalties for this industry to adopt TUW. Similarly, data centre operators must evaluate the long-term sustainability and operational viability of their water sources, ensuring that future growth can be supported without exacerbating local water stress or compromising community water security. Below we discuss these in detail for each key stakeholder.

Data Centre operators

The operators are responsible for facility design and water efficiency performance (measured through Water Usage Effectiveness or WUE). In Malaysia, the public utilities and data centre operators are working together to develop used water treatment facilities to reuse the urban sewage for cooling facilities (Skidmore, 2025). A similar model can be adopted in India to ensure high-quality treated used water for the facility to run its cooling facilities. To ensure more efficient water usage, the operators should also disclose in their annual reports how much TUW they have used in the previous year and their WUE. The effluent generated from these facilities should conform to established used water treatment and discharge standards. Particular attention should focus on monitoring any process additives to prevent the presence of harmful substances from entering the effluent. Compliance with all applicable regulatory requirements governing effluent water quality must be ensured before reuse or end-of-the-cycle discharge.

ULB and Utilities

ULBs play a foundational planning role: zonal industrial planning to cluster data centres in proximity to sewage treatment plants (STPs), provision of infrastructure for treated water transport, coordination with regulators to monitor groundwater extraction, and deployment of financing mechanisms such as green bonds to fund tertiary treatment upgrades. ULBs can also be responsible for implementing city-level reuse action plans and city water balance to manage industrial and domestic demand under the SRTW framework and should treat data centre water demands as an integrated component of city-level water planning.

Utilities should monitor and manage Treated Used Water (TUW) quality standards in line with the requirements of data centre operators, as well as applicable national and state regulatory frameworks. They should work collaboratively with data centre operators to track and improve water-use efficiency (WUE) and promote greater acceptance of TUW as a reliable alternative water source. Successful examples, such as the Ghaziabad Tertiary Treated Reverse Osmosis (TTRO) plant, demonstrate the value of such partnerships, where data centre operators have entered into long-term water user agreements and supported the development of tertiary used water treatment infrastructure to secure sustainable water supplies to the Sahibabad industrial area.

Regulators (CPCB, SPCBs, MoEFCC)

Regulators bear responsibility for Environmental Impact Assessments (EIA), regular audits, and enforcing ambient water quality standards for discharged coolant water. This includes ensuring that discharged cooling water does not elevate the ambient temperature of receiving water bodies and that chemical additives in coolant systems do not leach harmful substances. Currently, the absence of data centre-specific regulatory categories in EIA notifications represents a significant governance gap (CSE, Down to Earth, 2026).

6.3 Gaps in standards for cooling water reuse and enforcement mechanisms

Data centres are counted as essential services under 'The Essential Services and Maintenance Act', making them infrastructure of utmost importance. A foundational gap lies in the absence of water efficiency as a policy objective in the current data centre policies. While draft national and state-level frameworks have incorporated energy efficiency as a core metric, water efficiency has received no comparable treatment in the Data Centre Policy 2020. There are no nationally defined standards for TUW quality for data centre cooling applications, no mandated water use intensity benchmarks, and no enforceable Water Usage Effectiveness (WUE) thresholds (RAJYA SABHA, 2026). It is important to set clear standards for non-potable water usage, used water recycling, and cooling efficiency to ensure that capacity growth does not undermine community water security.

States should frame their data centre policies to showcase a sustainable use of water in data centres that requires basing it on a 6R framework: reduce, reclaim (removal), reuse, recycle, recover, and redesign. It also needs to focus on disaster resilience and future climatic challenges.

Gaps and challenges in existing state policies

Several state policies for data centres in India acknowledge the importance of an assured water supply for their operations. However, most policies provide only broad commitments and do not sufficiently elaborate on the existing challenges related to sustainable water use, used water reuse, or mitigation strategies for reducing freshwater dependency.

The Karnataka Data Centre Policy highlights the provision of 24×7 water supply to data centres. However, the policy does not acknowledge current water-related challenges, including increasing stress on urban water resources, dependence on freshwater for cooling operations, and mitigation strategies such as reuse of treated used water (TUW), adoption of advanced cooling technologies, and water-efficient infrastructure.

Similarly, the Andhra Pradesh Data Centre Policy 4.0 (2024–29) acknowledges the importance of sustainable measures for water consumption during data centre operations. However, the policy currently lacks specific incentives or implementation mechanisms that would promote the adoption of sustainable water management practices.

The Tamil Nadu Data Centre Policy 2021 states that data centres shall be encouraged to recycle water, but it does not provide detailed guidance on mechanisms, technologies, or regulatory pathways for achieving water recycling and reuse targets.

The Maharashtra IT/ITES Policy assures a 24×7 water supply to data centres and states that data centres should utilise recycled water to the fullest extent possible. However, clearer operational frameworks and standards for recycled water use are still required.

The Telangana Data Centres Policy focuses on providing water supply infrastructure for data centres but does not specifically address used water recycling, reuse frameworks, or water efficiency measures.

The Haryana State Data Centre Policy 2022 recognises the enormous water requirements of the data centre industry and assures a 24×7 water supply for data centres in the state. However, the policy does not comprehensively address water reuse strategies or sustainable cooling solutions.

The Uttar Pradesh Data Centre Policy 2021 provides assurance of uninterrupted 24×7 water supply and includes provisions for setting up common treatment plants within data centre parks. This is a positive step towards centralised used water management infrastructure.

The West Bengal Data Centre Policy 2021 assures continuous water supply and supports the establishment of captive water treatment plants and common water treatment infrastructure for data centre parks through West Bengal Electronics Industry Development Corporation Limited.

Among the reviewed policies, the Odisha State Data Centre Policy 2022 provides relatively stronger emphasis on sustainability measures. The policy highlights certain infrastructure requirements for establishing data centre projects – use of air-cooling systems during periods of low ambient temperatures, automated cooling systems wherever applicable, and the need for water-saving and resource-minimisation solutions for clearance. It also provides subsidies of up to 25% on cleaner and greener initiatives, limited to ₹1 crore, subject to accreditation by the State Pollution Control Board. While Rajasthan's 2025 policy proposes to integrate water conservation measures like used water recycling, zero liquid discharge, rainwater harvesting, groundwater recharge, and advanced water management systems, amongst others (Rajasthan Data Centre Policy, 2025).

Despite these policy initiatives, there remains a significant gap in defining standards for the use of treated used water (TUW) in data centre operations. Clear standards for treated used water quality suitable for cooling and other operational purposes should be established and adopted across states. Urban Local Bodies (ULBs) should enter into Memorandums of Understanding (MoUs) with data centres to facilitate long-term water-sharing agreements for TUW supply and to develop the necessary treated water distribution infrastructure. Such standards should be based on the city water balance and a pragmatic approach to increasing use of non-potable water to meet the continuous water supply to data centre, as mentioned in data centre policies across states. In addition, states should build stronger incentives for the adoption of advanced and water-efficient cooling technologies aimed at reducing excessive freshwater consumption. Such measures may include weighted tax deductions, capital subsidies, or green incentives for expenditure incurred on high-efficiency and advanced cooling systems.

7. Emerging Opportunities & Innovation Areas

7.1 Cluster-based approaches linking STPs and hyperscale centres

One of the methods proposed in the West Bengal policy is to support the establishment of water treatment plants within data centre parks.

Another approach could be to incentivise the installation of tertiary treatment plants at data centre premises like Malaysia through green subsidies, subject to accreditation by the State Pollution Control Boards, State Environment Impact Assessment Authority, and State Expert Appraisal Committee (SEACC and SEIAA) as suggested in the Odisha State Data Centre Policy 2022.

Utilities should identify, map, and digitalise used water treatment infrastructure within the zones where Data centres are established. Automated systems for water quality monitoring from these tertiary treatment plants can further ensure compliance with the required water quality standards to meet demand for cooling data centres. In addition, data centres may establish on-site tertiary treatment plants to achieve the desired treated water quality for reuse and operational requirements. It also requires building treated water conveyance infras-tructure to supply water to these data centre zones.

7.2 Decentralised systems for small data centres

Apart from hyperscale data centres, there are data centres run by small and medium enterprises in the country. The decentralised used water treatment systems can meet the cooling demands of these data centres. These data centres can meet their demand by signing a long-term agreement with utilities to ensure stable and sustainable operations.

7.3 Innovative business models – PPP and offtake models

Utilities can set up a system like the TTRO plant in Ghaziabad, which supplies tertiary-treated used water to the industries in Sahibabad industrial area.

The industry users list benefits as reduced cost for the pre-treatment of borewell water, which is often their primary source for industrial processes. It is therefore necessary to establish clear treated water quality standards in the national data centre policy, including water usage, water usage efficiency thresholds, and minimum recycled water usage limits, to provide a clear framework for utilities to follow. Similarly, Maharashtra State Power Generation Company (MAHAGENCO) in Nagpur started using TUW from the Nagpur Municipal Corporation Wastewater Reuse Project funded by MAHAGENCO and the 190 MLD Wastewater Reuse Project implemented under the PPP model for cooling its thermal power plants. Similar PPP models can be adopted by data centres operators, which can be further subsidised by incentives at the national and state levels (MAHAGENCO, n.d.).

8. Way Forward

India's rapidly expanding AI and hyperscale data centre ecosystem is expected to increase water demand significantly, particularly for cooling systems. However, this expansion is increasingly affecting existing urban water shortages, energy limitations, and climate challenges. To ensure sustainable long-term growth, it is crucial to integrate water sustainability into infrastructure planning as data centres develop in key cities such as Mumbai, Chennai, Hyderabad, Bengaluru, and emerging Tier-II urban centres.

Cooling a 100 MW hyperscale data centre can consume nearly 2 million litres of water daily, making water reuse strategies particularly important in water-scarce urban environments. Transitioning to TUW reuse for cooling presents an opportunity to align India's digital growth with circular economy principles, resource efficiency, and climate resilience.

A phased, state- and city-specific strategy can prove effective for coherent adoption of TUW reuse in data centre facilities. This would require a consistent policy framework that clearly maps used water generators, existing used water treatment infrastructure, and new treatment and conveyance systems. It should also promote coordination among local administrations, industrial used water reuse systems, and hyperscale facilities, supported by real-time monitoring and operational management to ensure effective implementation and compliance.

The initial focus could be on large hyperscale facilities in water-stressed cities and near STPs. Policy options could include several complementary actions, such as setting water reuse goals and establishing disclosure frameworks. State governments have already emerged as key drivers of data centre expansion, providing land, energy, and fiscal incentives. Sustainability-linked incentives could build on these existing policy instruments by offering concessional tariffs for treated used water supply, providing viability gap support for tertiary treatment and pipeline infrastructure, prioritising approvals for projects that integrate circular water systems, linking green data centre certifications to water efficiency performance, and encouraging the co-location of data centres near STPs and industrial reuse corridors. Such incentives may be particularly important during the early stages of market development when capital costs and operational uncertainties remain high.

National-level technical guidance may help to standardise operational practices and reduce implementation uncertainty. Water reuse for data centres should not be treated as a standalone intervention but as part of an integrated land–water–energy planning framework. Future planning frameworks may therefore integrate urban used water availability, grid reliability and renewable energy access, climate and flood risks, land-use compatibility, and industrial symbiosis opportunities. Pilot projects can help establish operational benchmarks, demonstrate feasibility, and support regulatory learning.

Further research is needed on techno-economic viability, water quality standards, operational performance, institutional coordination, and social implications of industrial water reuse. Continued stakeholder consultation will be critical to designing practical, equitable, and scalable pathways for sustainable AI infrastructure in India.

Rather than viewing sustainability and digital growth as competing priorities, India can position circular water use as a foundational pillar of resilient and future-ready AI infrastructure. Doing so will require coordinated policy frameworks, targeted pilot implementation, transparent disclosure systems, and continued engagement among industry, utilities, researchers, and policymakers.

References

1. AI Impact Summit. (2026). India AI Impact Summit 2026 Resources. Link: https://impact.indiaai.gov.in/
2. Amazon Sustainability. (n.d.). Water stewardship. Amazon. https://sustainability.aboutamazon.com/natural-resources/water
3. Centre for Science and Environment. (2026, April). *Down To Earth magazine: India is using water to build the machines that tell us we are running out of it*. https://www.downtoearth.org.in/water/india-is-using-water-to-build-the-machines-that-tell-us-we-are-running-out-of-it
4. Data Center Dynamics. (2024). *Amazon to expand number of data centers using recycled water to 120*. https://www.datacenterdynamics.com/en/news/amazon-to-expand-number-of-data-centers-using-recycled-water-to-120/
5. Del Rosario, F. L. U., Montallana, J. N. T., Huang, T.-Y., Aberilla, J. M. O., & Tu, Y.-M. (2025). Environmental and economic sustainability of wastewater reclamation and reuse in urban areas. *Journal of Environmental Chemical Engineering, 13*(6). https://doi.org/10.1016/j.jece.2025.119520
6. Deloitte. (2025). *Accelerating AI infrastructure investments in India*. Deloitte India. https://www.deloitte.com/content/dam/assets-zone1/in/en/docs/services/engineering-ai-data/in-eaid-accelerating-ai-infrastructure-investments-in-india.pdf
7. DTE (2026, May 5). India must balance AI innovation with environmental integrity. Down To Earth. Link: https://www.downtoearth.org.in/science-technology/india-must-balance-ai-innovation-with-environmental-integrity
8. Economic Times. (2026, January 10). *India's data centre additions double in 2025, capacity set to triple by 2030: Report*. The Economic Times. https://infra.economictimes.indiatimes.com/news/urban-infrastructure/indias-data-centre-additions-double-in-2025-capacity-set-to-triple-by-2030/126432081
9. Gandiglio, M., Lanzini, A., Soto, A., Leone, P., & Santarelli, M. (2017). Enhancing the energy efficiency of wastewater treatment plants through co-digestion and fuel cell systems. *Frontiers in Environmental Science, 5*, 70. https://doi.org/10.3389/fenvs.2017.00070
10. Google Cloud. (2026, April 28). *Google breaks ground on India AI hub, launching a national industrial ecosystem alongside India's digital infrastructure milestone*. Google Cloud Press Corner. https://www.googlecloudpresscorner.com/2026-04-28-Google-Breaks-Ground-on-India-AI-Hub,-Launching-a-National-Industrial-Ecosystem-Alongside-Indias-Digital-Infrastructure-Milestone

11. Google. (2022, July 13). *Our commitment to climate-conscious data center cooling*. Google Blog. https://blog.google/outreach-initiatives/sustainability/our-commitment-to-climate-conscious-data-center-cooling/

12. Government of India, Press Information Bureau. (2026, March 13). *Data centre capacity in the country has increased from about 375 MW in 2020 to around 1500 MW by 2025.* Press Information Bureau. https://www.pib.gov.in/PressReleasePage.aspx?PRID=2239616&reg=3&lang=1

13. Government of India, Principal Scientific Adviser (PSA). (2025). *Democratising access to AI infrastructure* (Version 3.0). Link: https://psa.gov.in/CMS/web/sites/default/files/publication/WP_Democratising%20Access_V3.0_29122025A.pdf

14. Government of Rajasthan. (2025). Rajasthan Data Centre Policy – 2025. Government of Rajasthan Link: https://rising.rajasthan.gov.in/storage/app/public/files/pdf/rajasthan-data-centre-policy-2025.pdf

15. International Energy Agency (IEA). (2025). Energy and AI. International Energy Agency. Link: https://iea.blob.core.windows.net/assets/de9dea13-b07d-42c5-a398-d1b3ae17d866/EnergyandAI.pdf

16. Li, P., Yang, J., Islam, M. A., & Ren, S. (2023). Making AI less "thirsty": Uncovering and addressing the secret water footprint of AI models. arXiv. Link: https://doi.org/10.48550/arXiv.2304.03271

17. Li, P., Yang, J., Islam, M. A., & Ren, S. (2023). *Making AI less "thirsty": Uncovering and addressing the secret water footprint of AI models* (arXiv No. 2304.03271). arXiv. https://doi.org/10.48550/arXiv.2304.03271

18. Maharashtra State Power Generation Company Limited. (n.d.). Recycling and reuse of STP treated waste water at NMC at various TPS. MAHAGENCO. https://www.mahagenco.in/recycling-and-reuse-of-stp-treated-waste-water-at-nmc-at-various-tps/

19. Malik, A., & Elango, S. (2026, January 19). *Why India must plan for AI data centres' energy and water footprint*. CEEW. https://www.ceew.in/blogs/why-is-water-based-cooling-a-big-issue-for-ai-data-centres-in-india

20. Ministry of Power. (2016). *Tariff policy, 2016* (Notification No. 23/2/2005-R&R (Vol. IX)). Government of India. Link: https://cercind.gov.in/2018/whatsnew/Tariff_Policy-Resolution_Dated_28012016.pdf

21. Molinos-Senante, M., Hernandez-Sancho, F., & Sala-Garrido, R. (2013). Tariffs and Cost Recovery in Water Reuse. *Water Resources Management*, 27(6), 1797–1808. https://doi.org/10.1007/s11269-012-0111-4

22. Mytton, D. (2021). Data centre water consumption. *npj Clean Water*, *4*(11). https://doi.org/10.1038/s41545-021-00101-w

23. National Mission for Clean Ganga. (2022). *National framework on safe reuse of treated water*. Ministry of Jal Shakti, Government of India.

24. National Mission for Clean Ganga. (2023). *Solution document for the safe reuse of treated water (SRTW): Panipat, Haryana*. Ministry of Jal Shakti, Government of India.

25. NITI Aayog. (2026). Per Capita Water Availability. Retrieved from https://iced.niti.gov.in/climate-and-environment/water/per-capita-water-availability

26. Press Information Bureau (PIB). (2025, March 5). *India's data centre sector attracts massive investments and expansion* [Press release]. Government of India. https://www.pib.gov.in/PressReleaseDetail.aspx?PRID=2227953&reg=6&lang=1

27. Press Information Bureau. (2026, February 14). *Budget 2026–27 sets the stage for India as a global hub for cloud and AI infrastructure* (Press Release No. 2227953). Government of India. Link: https://www.pib.gov.in/PressReleasePage.aspx?PRID=2227953&reg=3&lang=2

28. PRNewswire. (2026, February 17). *Adani Group to invest $100 billion in renewable-powered AI data centres by 2035*. PR Newswire. https://www.prnewswire.com/news-releases/adani-group-to-invest-100-billion-in-renewable-powered-ai-data-centres-by-2035-302689643.html

29. Rajya Sabha.(2026, March 20). UNSTARRED Question No. 3249. Link; https://sansad.in/getFile/annex/270/AU3249_udB0eS.pdf?source=pqars

30. RCR Wireless. (2025). The top five AI data centers in India. Link: https://www.rcrwireless.com/20250326/fundamentals/top-ai-data-centers-india

31. Research and Markets. (2026). India Data Centre Cooling Market, By Region, Competition, Forecast and Opportunities 2020-2030F. Link: https://www.researchandmarkets.com/reports/6008177/india-data-centre-cooling-market-region?utm_source=GNE&utm_medium=PressRelease&utm_code=pkx53s&utm_campaign=2002401+-+Data+Centre+Cooling+Market+Opportunities+in+India%2c+2024-2030%3a+How+Leading+Players+are+Dealing+with+the+Integration+Complexity+of+Existing+Infrastructure&utm_exec=jocamspi

32. Shehabi, A., Smith, S., & Sartor, D. (2016). United States Data Center Energy Usage Report. Berkley Lab, 65. https://eta-publications.lbl.gov/sites/default/files/lbnl-1005775_v2.pdf

33. Skidmore, Z. (2025, April 4). AirTrunk establishes recycled water supply initiative in Malaysia. Data Center Dynamics. Link: https://www.datacenterdynamics.com/en/news/airtrunk-establishes-recycled-water-supply-initiative-in-malaysia/

34. Sustainability Directory. (2025, November 24). *Tiered water pricing*. https://lifestyle.sustainability-directory.com/area/tiered-water-pricing/

35. Sutariya, D. 2025. Data Centers in India: 2025 Overview by Region. Link: https://indiadatamap.com/2025/12/13/data-centers-in-india/

36. Tripathi, V., Bagui, D., Aggarwal, P., Hulshof, P., Chopra, A., Jain, D., & Vashishtha, A. (2026). *Scaling India's data centre ecosystem: Stakeholder perspectives on infrastructure, energy, and resilience*. Council on Energy, Environment and Water (CEEW) & SYSTEMIQ. Link: https://www.ceew.in/sites/default/files/ceew-data-centre-study-web-ready-final.pdf

37. U.S. Environmental Protection Agency. (2025). *Water reuse case study: Quincy, Washington*. U.S. EPA. https://www.epa.gov/waterreuse/water-reuse-case-study-quincy-washington

38. United Nations Educational, Scientific and Cultural Organization. (2020). *Water reuse within a circular economy context*. UNESCO Publishing. https://unesdoc.unesco.org/ark:/48223/pf0000374715.locale=en

39. United States Environmental Protection Agency. (n.d.). *Water reuse case study: Quincy, Washington*. U.S. Environmental Protection Agency. https://www.epa.gov/waterreuse/water-reuse-case-study-quincy-washington

40. WateReuse Association. (n.d.). *Artificial intelligence and water reuse*. WateReuse Association. https://watereuse.org/educate/types-of-reuse/artificial-intelligence-reuse/

41. World Bank. (2020, March 19). *Wastewater a resource that can pay dividends for people, the environment, and economies*. https://www.worldbank.org/en/news/press-release/2020/03/19/wastewater-a-resource-that-can-pay-dividends-for-people-the-environment-and-economies-says-world-bank

42. World Economic Forum. (2024). *Circular water solutions key to sustainable data centres*. https://www.weforum.org/stories/2024/11/circular-water-solutions-sustainable-data-centres/

43. Yañez-Barnuevo. 2025. Environmental and Energy Study Institute (EESI) Data Centers and Water Consumption. Link: https://www.eesi.org/articles/view/data-centers-and-water-consumption

NOTES

Designed & Printed by: **Paper Play,** Delhi. M: 7011994124, E: contact@paperplay.co.in

mμ gamma

Email: gbharat@mugammaconsultants.com