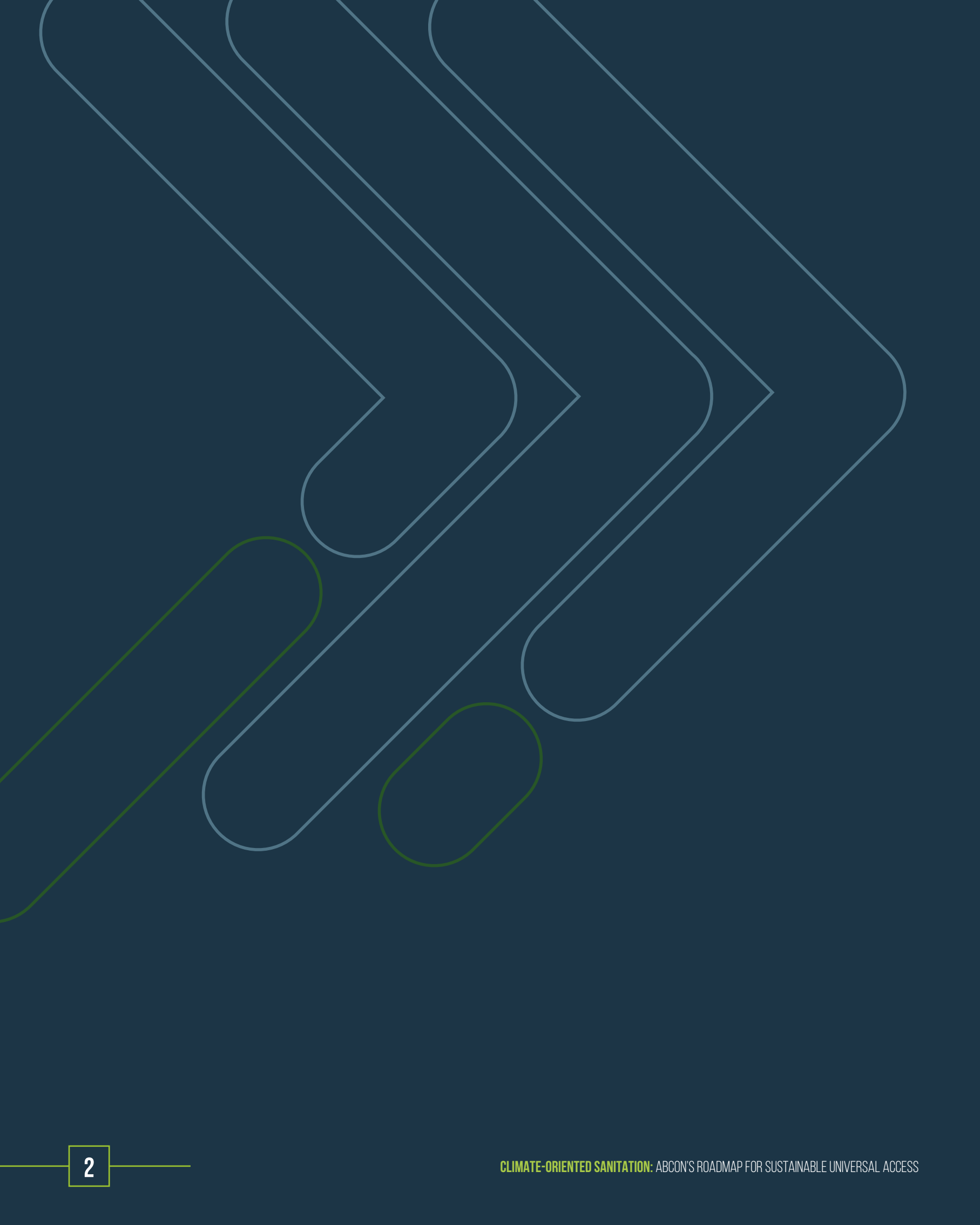




CLIMATE-ORIENTED **SANITATION:**

ABCON'S ROADMAP FOR
SUSTAINABLE UNIVERSAL ACCESS



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EDITORIAL

Sanitation: a non-deferrable climate commitment

We are living a decisive moment. The climate emergency is no longer a future scenario, but a present reality, whose effects already impact the daily life of Brazilian cities: prolonged droughts, extreme events, floods, and increased pressure on water resources. Despite this challenge, the basic sanitation sector undertakes a strategic and unavoidable role.

Currently, sanitation is one of the main agendas for climate change mitigation and adaptation in Brazil. Universalizing access to drinking water and sewage treatment is, at the same time, a social response and an environmental solution. Expanding sewage collection and treatment means reducing river pollution, improving the quality of surface and groundwater, and preserving biodiversity. On the other hand, the safe supply of water, even in scenarios of water scarcity, is a critical resilience factor for millions of Brazilians.

In this context of growing inequality and environmental emergency, there can be no effective response to the climate crisis without advancing in the universalization of access to water and sanitation services. Sanitation is the structuring link between social inclusion, public health, and adaptation to climate change.

ABCON Agenda for Sustainable Universalization is more than a document. It is a call to action. It represents the collective effort of private operators who, in cooperation with the public sector and society, aim to expand international dialogue and strengthen Brazil's position as a reference in sustainable solutions in the sector.

Rogério Tavares*
ABCON SINDCON Board of Director's President

* A Civil Engineering graduate from PUC-RJ and holding an MBA in Finance from IBMEC, Tavares serves as Vice President of Institutional Relations at Aegea and has extensive experience in the sanitation sector. He was Executive Director of Infrastructure and Sanitation at Caixa Econômica Federal. He is also a member of the Advisory Board and coordinator of the Water Resources and Basic Sanitation Committee at Abdib.

EXECUTIVE DIRECTOR'S MESSAGE

Sustainable universalization: a legacy we can build now

We are facing a decisive decade for Brazilian sanitation. The legal deadline for universalization is approaching, and the impacts of climate change make the expansion of water and sewage services even more urgent. Sustainable universalization is, at the same time, an ambitious goal and an unavoidable necessity.

Companies in the sector have been investing in concrete solutions to address the effects of climate change: the use of renewable energy, loss reduction, water reuse, and watershed recovery. These practices are already underway and demonstrate the technical capacity and environmental responsibility of private operators.

This document reinforces our international stance that sanitation must be recognized as a central policy in combating the climate crisis. **At the United Nations Climate Change Conference (COP30)**, we will present a set of evidence, best practices, and proposals to strengthen public policies, financing mechanisms, and incentives for technological innovation.

Our message is clear: Brazil has the opportunity to lead by example. With legal certainty, adequate financing, and collaboration between the public and private sectors, we can build a fairer, healthier, and more sustainable future. Investing in sanitation is investing in resilience, social justice and a sustainable future. Sanitation cannot wait. Neither can the climate.

Enjoy your reading!

Christianne Dias*

ABCON SINDCON Executive Director

* Graduated in Law at the Catholic University of Brasília and currently pursuing a PhD in Law at UniCEUB, Christianne Dias served as Chairwoman of the National Water and Sanitation Agency of Brazil (ANA). With extensive experience in public administration, she also served as Deputy Chief for Infrastructure at the Legal Affairs Office of the Civil House of the Presidency of the Republic.



INTRODUCTION

The world is facing an unprecedented climate crisis. The effects of climate change, with increasingly frequent and intense **extreme events**, are already being felt concretely in cities, in rural areas, and—above all—in the lives of people in situations of greater socioeconomic vulnerability.

In Brazil, a country with one of the largest freshwater resources in the world, water scarcity is already a reality in several regions. Floods, prolonged droughts, degradation of water sources and pressure on natural resources are just some of the most visible manifestations of this crisis.

The basic sanitation sector holds a strategic position in this context. Ensuring universal access to safe drinking water and sanitation is one of the main public policies for climate change adaptation, strengthening the resilience of cities and their populations. The environmental agenda of the Sustainable Development Goals (SDGs) also underscores the urgency of advancing basic sanitation. SDG 6, which addresses universal access to safe drinking water and sanitation, recognizes these services as essential for economic development, environmental protection and the promotion of human dignity.

It is a **climate adaptation policy by excellence**: expanding water supply and sewage infrastructure reduces the population's vulnerability to waterborne diseases, improves quality of life, and ensures supply even under water stress conditions.

With the approval of the new **Legal Framework for Sanitation** (Law No. 14,026/2020), Brazil is entering a new age of infrastructure expansion with strong private-sector participation. Regulatory predictability, legal security and institutional advancements have enabled the sector to achieve historic investment records in the last years.

In **ABCON Agenda for Sustainable Universalization**, we display the **evidence** that places sanitation as a strategic environmental solution for Brazil. We address the impacts of inadequate infrastructure, **ongoing initiatives** to tackle climate change, and the **sector's proposals** to accelerate universalization with environmental responsibility.

Sanitation is, above all, a climate policy. The future of the climate relies on universalization.



**Universalizing
sanitation
means **reducing**
river pollution,
preserving water
resources
and **promoting**
public health**

01

UNIVERSALIZATION AS AN ENVIRONMENTAL AGENDA



Universalizing water and sewage services in Brazil is one of the most effective actions for the restoration and protection of natural resources. **Lack of urban sewage collection and treatment** is currently the main factor contributing to the degradation of Brazilian water bodies.

According to a survey by the National Water and Sanitation Agency, more than 110,000 km of rivers in Brazil have **water quality compromised** by excessive organic load—a direct consequence of the absence of sewage treatment. This situation undermines aquatic biodiversity, increases water abstraction and treatment costs, and aggravates water insecurity, especially in the most vulnerable regions.

The universalization of sanitation in Brazil will represent a **historic leap**: each year, more than 14 billion m³ of sewage **will be treated**, equivalent to over 5.6 million filled Olympic-sized swimming pools¹

83,000 km
of rivers are so polluted that they **cannot be used** for water supply abstraction

27,000 km
of rivers require **advanced treatment** before being used for water supply

Source: National Water and Sanitation Agency of Brazil (ANA)

This is the volume of pollution that will no longer be discharged untreated into rivers, lakes, and seas protecting water resources, public health and the environment.

As previously mentioned, companies in the sector have been increasingly investing in innovative and concrete solutions to address the effects of climate change. From this point onward, explore some **initiatives and case studies of companies associated with ABCON SINDCON**, presented throughout this document.

¹ Projection ABCON SINDCON based on data from IBGE, SNIS and SINISA.

Reducing losses and advancing universal access

RJ • Águas de Niterói (Grupo Águas do Brasil)

Since Águas de Niterói took over the water distribution, sewage collection, and treatment services in the municipality of Niterói (RJ) in 1999, the city's sanitation system has undergone a true transformation. In a short time, Niterói became a national benchmark: it is the first city in the state of Rio de Janeiro and the sixth in the country in basic sanitation, according to the Instituto Trata Brasil ranking. Furthermore, it stands out in combating water losses, with a rate below 25%, well below the national average.

In the first three years of the concession, water supply coverage rose from 72% to 100% of the population, with the implementation of distribution systems for the Oceanic Region, Pendotiba, Várzea das Moças and Rio do Ouro. Loss reduction also allowed the concessionaire to supply

approximately 150,000 additional people using the same water volume.

The loss rate, which exceeded 32% in 2017, was reduced to less than 25% thanks to the program Água de Valor, developed by the concessionaire. The initiative aims to increase the efficiency of distribution systems, improve measurement and control, and ensure current supply without jeopardizing future generations.

In the area of sewage treatment, progress was also significant: coverage increased from just 35% to 95.6% of the population served with collection and treatment, through nine Wastewater Treatment Plants (WWTPs), which are essential for improving the environmental quality of Guanabara Bay and the local lagoons.



Photos: Courtesy of Águas do Brasil

Conservation of water source

SP • *Companhia Saneamento de Jundiaí*

Throughout history, the Jundiaí River has played a crucial role for the population of this São Paulo municipality, serving as a water source, transportation route and recreational space. Due to industrialization and the growth of inland São Paulo cities, by the 1970s the river had already been considered one of the most polluted in the state—some stretches in worse condition than the Tietê River.

In the early 1980s, the Committee for the Study and Recovery of the Jundiaí River was formed, bringing together the municipalities along its banks, industry representatives and State Government agencies, with the goal of cleaning up the water body. One of the first actions was to implement sewage treatment in Jundiaí, which was responsible for the largest pollutant load in the river.

In 1998, the Jundiaí Sewage Treatment Plant began operations, managed by Jundiaí Sanitation Company, one of the first private concessions for this service. Jundiaí became a regional benchmark in sanitation.

Thirty-five years after the committee was established and its cleanup actions began, in 2017 the Jundiaí River's classification improved from Class IV to Class III, becoming recognized as a regional water source.

Currently, due to the region's chronic water scarcity, some cities already capture its waters for treatment and public supply. This highlights the importance of regional planning and shows how investments in sanitation enable the expansion of water sources and strengthen cities' resilience to climate change.



Photo: Courtesy of Companhia de Saneamento Jundiaí



Current scenario and projections for 2040

With changes in rainfall patterns and increased climate variability, water supply systems have been facing growing risks. Improving **the management of potable water supply** systems and expanding sanitation coverage are direct ways to reduce pressure on water sources, enhance surface water quality, and increase water availability for multiple uses.

In 2024, total water consumption in Brazil is estimated at 2,151.1 cubic meters per second (m³/s). Irrigation accounts for the largest share of this demand, at 1,084.0 m³/s, corresponding to just over half of the national total (50%). Next comes human consumption—including both urban and rural areas—at 527.8 m³/s (25%), followed by industry, at 197.2 m³/s. Water used for livestock accounts for 8% of national consumption, while thermoelectric and mining uses have smaller but growing shares (see table below).

Projections for 2040 indicate a significant increase in **pressure on water resources**, with total consumption estimated at 2,771.6 m³/s, representing a **28.8% rise compared to 2024**. Irrigation is the sector with the largest absolute and relative growth, increasing by 43.3% and raising its share to 56% of the total. Mining, although smaller in overall volume, shows the highest proportional growth among the analyzed sectors, with an increase of 64%. On the other hand, human consumption, although increasing in absolute terms (7.7%), loses relative share, dropping from 25% to 21%, signaling a shift in water pressure toward economic use.

In the **Midwest**, water consumption is expected to grow by 45.3% by 2040, the highest percentage increase among Brazilian regions. Irrigation dominates demand, and it will intensify even further, growing by 70.2%, while

human consumption will increase by only 14%, losing relative weight in the regional water balance.

In the **Northeast**, pressure on water resources will rise by 32.2% by 2040, driven mainly by the expansion of irrigation, which is projected to surge by 45.9%. Human consumption will grow modestly (5.4%), and its share is expected to decline.

The **North** region is projected to see a 28.4% increase in water demand, with irrigation playing a strong leading role, growing by 42.1% during the period. Even so, human consumption will see significant growth (16.6%), reflecting increasing urbanization and the need to expand water supply coverage.

In the **Southeast**, the most populous region of the country, water consumption is expected to increase by 27.9% by 2040. Irrigation remains the main growth driver, with a 56.4% rise, while human consumption will see only a modest increase of 6.2%, pointing to a higher concentration of use in productive activities.

Finally, the **South** will experience the lowest projected growth in total demand (19.7%), but still with significant expansion in irrigation (22.5%). Human consumption will see modest variation (6.7%), suggesting relative stability, though with greater pressure due to agricultural activities.

Given the **rising demand for water** across all sectors and regions, basic sanitation plays an even more strategic role in the sustainable management of water. By expanding access to safe supply, reducing losses, treating and reusing effluents, the sector directly contributes to the country's water security.

WATER RESOURCE PROFILES



BRAZIL

Sector	Use 2024 (m³/s)	Participation 2024	Use 2040 (m³/s)	Participation 2040	Growth
	2,151.1	-	2,771.6	-	28.8%
Irrigation	1,084	50%	1,553.5	56%	43.3%
Human consumption	527.8	25%	568.5	21%	7.7%
Industry	197.2	9%	250.7	9%	27.1%
Animals	168.5	8%	203.1	7%	20.5%
Mining	34.4	2%	56.4	2%	64.0%
Thermoelectricity	139.2	6%	139.4	5%	0.1%



MIDWEST

	225.4	-	327.5	-	45.3%
Irrigation	105.7	47%	179.9	55%	70.2%
Human consumption	38.5	17%	43.9	13%	14.0%
Industry	27.8	12%	40.2	12%	44.6%
Animals	50.6	22%	59.8	18%	18.2%
Mining	1.2	1%	2.0	1%	66.7%
Thermoelectricity	1.6	1%	1.7	1%	6.2%



NORTHEAST

	499.3	-	660.1	-	32.2%
Irrigation	294.2	59%	429.1	65%	45.9%
Human consumption	121.0	24%	127.5	19%	5.4%
Industry	40.6	8%	54.3	8%	33.7%
Animals	25.6	5%	30.9	5%	20.7%
Mining	0.7	0%	1.2	0%	71.4%
Thermoelectricity	17.2	3%	17.1	3%	-0.6%



NORTH

	187.6	-	240.9	-	28.4%
Irrigation	53.4	28%	75.9	32%	42.1%
Human consumption	51.9	28%	60.5	25%	16.6%
Industry	4.8	3%	6.6	3%	37.5%
Animals	36.1	19%	49.4	21%	36.8%
Mining	11.0	6%	18.0	7%	63.6%
Thermoelectricity	30.4	16%	30.5	13%	0.3%



SOUTHEAST

	731.4	-	935.7	-	27.9%
Irrigation	282.9	39%	442.4	47%	56.4%
Human consumption	248.1	34%	263.6	28%	6.2%
Industry	85.9	12%	100.6	11%	17.1%
Animals	29.8	4%	32.6	3%	9.4%
Mining	19.4	3%	31.2	3%	60.8%
Thermoelectricity	65.3	9%	65.3	7%	0.0%



SOUTH

	507.3	-	607.4	-	19.7%
Irrigation	347.8	69%	426.2	70%	22.5%
Human consumption	68.4	13%	73.0	12%	6.7%
Industry	38.0	7%	49.1	8%	29.2%
Animals	26.4	5%	30.5	5%	15.5%
Mining	2.1	0%	4.0	1%	90.5%
Thermoelectricity	24.6	5%	24.6	4%	0.0%

Trends in water consumption patterns reinforce the urgency of incorporating the climate variable into resource management. Projections by ANA indicate that, by 2040, Brazil's Water Resources Management Units (UGRHs) will experience a significant worsening of the water balance.

The **quantitative water balance** is used as a measure of the degree of pressure on water resources in a given region. It expresses the proportion of effective water availability that is being demanded by **consumptive uses**—which withdraw water from the system without returning it. The indicator is calculated as the ratio between the flow withdrawn for consumption and the flow available with high reliability, with results expressed as percentages of water stress. Levels of stress are classified as **low, moderate, critical, or intermittent** (when there is not enough flow to ensure supply).

In the climate scenario, a more severe configuration was adopted, characterized by a significant increase in irrigation demand and by the reduction of water availability in crucial regions of the country. The scenario considers the impact of climate change and projects the quantitative condition of resources in each unit².

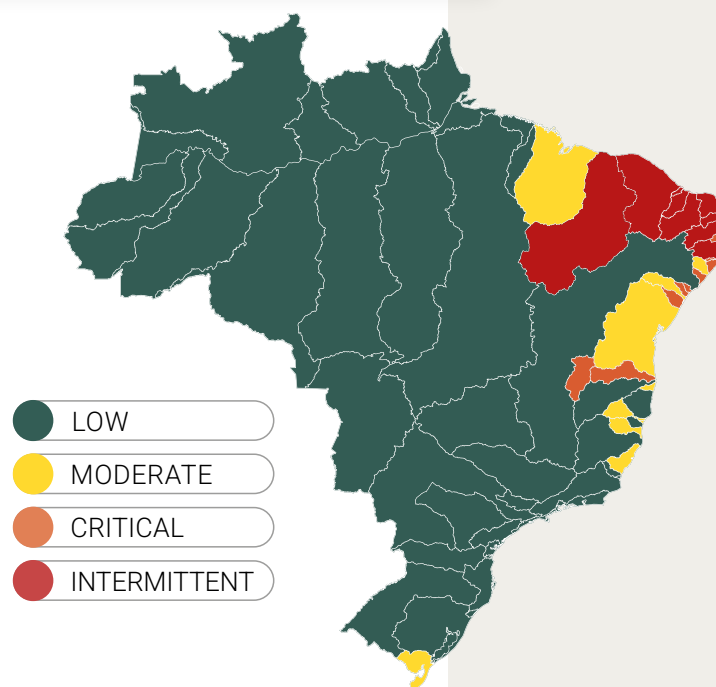
Of the 64 UGRHs analyzed, **62.5% will contain areas considered critical or intermittent**. In addition, **25% of the units will be classified as critical or intermittent**—with predominance of critical or intermittent stretches in their area—indicating that demand tends to dangerously exceed or approach supply.

The intensification of this imbalance between water supply and demand poses concrete challenges to national water security. The trend is toward greater vulnerability of ecosystems and populations, with impacts on **urban water supply and city resilience**.

²For the methodological details of the scenarios, consult ANA. Available by [clicking here](#). Accessed in July 2025.

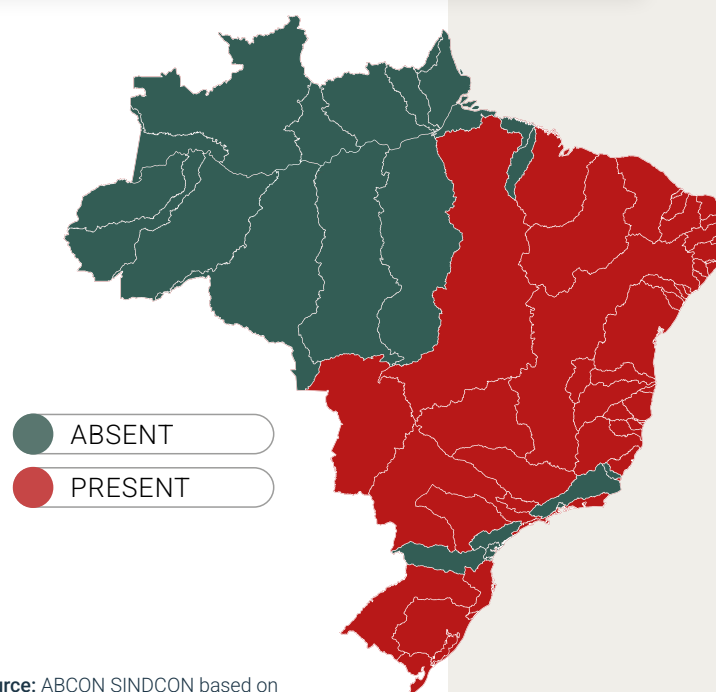
MAP 1

Water balance in 2040 under the climate change scenario



MAP 2

UGRHs with critical or intermittent areas in 2040 under the climate change scenario



Source: ABCON SINDCON based on National Water and Basic Sanitation Agency (ANA) projections

Water management during drought periods

TO • *Hidro Forte Saneamento (Norte Saneamento)*

The small town of Chapada de Areia, in the inland of Tocantins, with around 1,500 residents, is served by *Hidro Forte*, maintaining a healthy and sustainable operation that fulfills the goal of providing quality basic sanitation to the entire population.

With 435 billed water connections, 100% of the population is currently connected to the supply network, and it has water meters installed ensuring effective control of both supply and consumption. This progress has occurred over the past three years, placing the town in a prominent position among municipalities of similar sizes. The average water consumption per resident is 132 liters per day, below the national average of 176 liters, according to SINISA 2023 data.

The municipality is one of the smallest in Brazil with a sanitation service regulated and overseen by a specialized agency. The Tocantins Regulatory Agency (ATR) is responsible for monitoring the provision of sanitation services.

The region faces diverse and complex challenges. Water availability is a critical issue, especially during the severe drought periods typical of Tocantins, which requires careful planning to ensure a regular supply. Additionally, constant maintenance of the distribution network is essential to prevent frequent interruptions, ensuring service continuity and customer satisfaction.

Hidro Forte employs modern technologies for monitoring and rapid repairs, minimizing impacts on residents. Environmental education programs and initiatives promoting the rational use of water are also carried out, strengthening community engagement and raising awareness about the importance of sanitation.

Chapada de Areia is an example of how significant results can be achieved through planning, technology, and responsible management, reaffirming the importance of sanitation as a driver of sustainable development and social inclusion.

Photo: Courtesy of Hidro Forte Saneamento



Photo: Courtesy of Terracom Saneamento



Investments in water security

SP • Águas de Araçoiaba da Serra (Terracom Saneamento)

The city of Araçoiaba da Serra (SP) reached a turning point after the utility company *Águas de Araçoiaba da Serra* launched an emergency plan to tackle the most severe drought in the last ten years, which had caused fluctuations in raw water quality and black-outs that threatened the distribution network.

Key operational reinforcements Implemented by the concessionaire included three underground water intakes that reshaped the local water balance: the Laura Well was brought back online, supplying over ten million liters per month to the central area; the Master Well was upgraded, increasing supply to 32 million liters for the

Araçoiabinha neighborhood; and the Campininha Well added around 14 million liters per month to Alto dos Pinheirais.

The system also received generators capable of supporting 75% of supply in the event of power outages, a booster at the Campo do Meio reservoir that stabilized pressure in the urban center, and a sludge dewatering module with water reuse at the Jundiaquara Water Treatment Plant.

The entire strategy was based on duplicating critical resources—both water and energy—to restore regular service and rebuild user confidence.

02 ADDRESSING THE CHALLENGES OF CLIMATE CHANGE



Tackling environmental challenges posed by climate change has already become part of the daily routine for private sanitation operators in Brazil. Changes in hydrological patterns, extreme rainfall and drought events, and rising average temperatures have directly impacted the operation of water supply and sewage systems.

Hence, the sector recognizes the growing need to adopt measures that expand water availability and improve water quality through **integrated initiatives, sustainable management of water resources and efficient water use**; thereby enhancing system resilience in the face of climate change.

Due to extreme events, water supply and sewage systems must act quickly to ensure the quality of distributed water and the proper removal and treatment of sewage. This requires **adaptive capacity, rapid operational responses, and coordinated** efforts by service providers.

Water availability

The sector faces an increasingly challenging reality regarding water availability. The frequency and intensity of droughts have risen, directly affecting the levels of reservoirs, rivers, and aquifers that supply thousands of municipalities.

This **water scarcity** causes interruptions in supply, requiring the adoption of water rotation schemes, rationing, and the implementation of emergency alternative sources. In addition, the natural recharge of underground aquifers is reduced, making them progressively less available. As a result, both the regularity of services provided and the water security of the populations served are jeopardized.

At Sewage Treatment Plants (STPs), lower water consumption a direct consequence of scarcity—reduces the volume of collected sewage, creating a series of operational challenges. Key issues include the accumulation of solids in collection networks, frequent blockages, increased odors from the production of sulfurous gases, and higher concentrations of organic



load, all of which require adjustments in the biological treatment processes.

Another significant effect is the reduced carrying capacity of water bodies to absorb and dilute treated effluents. This may require higher levels of treatment and the adoption of stricter conditions for effluent discharge. Adding to this is the increase in **saltwater intrusion** events at surface water intakes—especially in shore regions, such as the Northeast. With lower river flows, the saline wedge advances, raising the salinity of the captured water and requiring adaptations in treatment processes.

The **rise in operational costs** has been another direct consequence of water scarcity. The need to operate alternative sources, the intensive use of chemicals, and the activation of more robust pumping systems, including power generators, increase costs.

Moreover, conflicts over water use are becoming increasingly frequent, particularly in regions with extensive agricultural irrigation and industrial demand. In such cases, prioritizing water allocation for human consumption requires coordination among various regulatory bodies and water users.

Finally, **the operating hours of water intake systems** and the need for **more frequent maintenance of pumps and pipelines** also increase due to operations under conditions of hydric stress and extreme flow variations.

Actions taken by the sector

In response to this scenario, private operators have developed a range of initiatives aimed at mitigating the impacts of water scarcity and ensuring the continuity of services.

The **restoration and conservation of water sources** has become a priority. Utilities have invested in actions such as reforestation of riparian forests and recharge areas, protection of springs, control of erosive processes, and social mobilization to reduce inappropriate water use within catchment basins. Systematic inspections of rivers and streams are also conducted, enabling

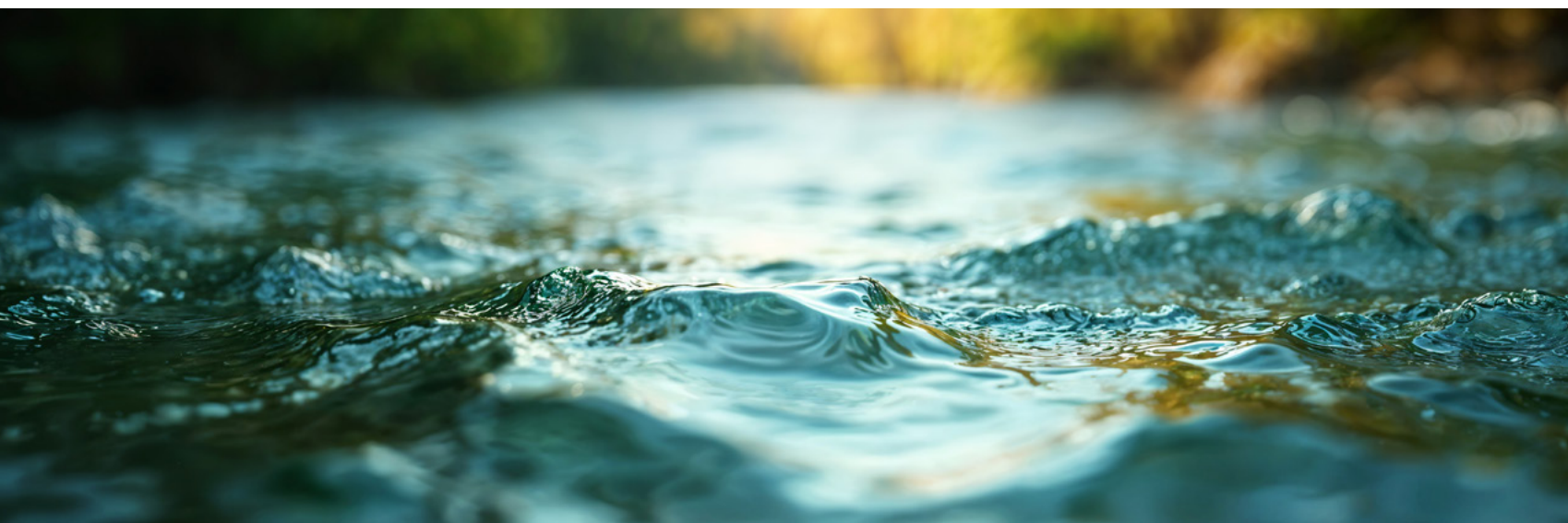
continuous monitoring of water quality and the integrity of water sources.

The interconnection of water supply systems is another expanding strategy. This measure creates operational redundancies and allows for the transfer of water between different regions as needed.

The expansion of non-potable water reuse is another key focus, with treated effluents used for industrial purposes, irrigation of green areas and street cleaning. In regions with structural water scarcity, **desalination of brackish or seawater** has been adopted as a long-term solution.

Storage and distribution infrastructure has also been strengthened through the implementation of **strategic reservoirs and long-distance pipelines**, increasing service capacity during critical periods.

Finally, **operational automation**—through **SCADA systems, telemetry, hydraulic modeling, and IoT-based remote sensing**—has enhanced the efficiency of system management, allowing for risk anticipation and optimized operation under water-constrained conditions.



The following section presents some of the initiatives being implemented by the sector, with a focus on water availability and quality.

Water supply solutions for industry

ES • Águas de Reúso de Vitória (GS Inima Brasil)

Águas de Reuso de Vitória, led by GS Inima Brasil (a subconcessionaire of Cesan serving ArcelorMittal and Vale), is a landmark innovation in water reuse in Brazil. The initiative transforms an environmental liability—urban wastewater—into a strategic water supply solution for industry, directly enhancing water security in the Greater Vitória Metropolitan Region (ES). With a capacity to produce over 390 liters per second of demineralized reused water, the project serves the equivalent of a city with more than 200,000 inhabitants.

GS Inima Brasil undertook a 30-year subconcession to decommission the Camburi WWTP, build the new Water Reuse Production Station (EPAR), and operate the associated infrastructure. Located in Serra (ES), the station will treat up to 450 liters per second of municipal wastewater, converting 87% of this volume into high-quality reused water for industrial purposes.

The system integrates advanced biological processes to remove organic pollutants, nitrogen compounds, and phosphorus, combined with mechanically robust ultrafiltration membranes. These membranes require minimal backwashing and have a lifespan exceeding 20 years, reducing both waste generation and lifecycle costs.

Replacing the conventional lagoon-based system of the former Camburi WWTP with this advanced technology significantly cuts greenhouse gas emissions, particularly methane (CH_4), which is highly produced in traditional treatment.

Additionally, the project opens opportunities for carbon credit quantification and validation, positioning GS Inima Brasil for voluntary carbon markets, supporting decarbonization of the served industrial operations, and providing a scalable climate solution.





ASSOCIATE CASE

Overcoming water rationing

SP • Águas de Casa Branca (Terracom Saneamento)

Casa Branca (SP) reached a milestone, completing seven years without water rationing—a rare achievement in inland São Paulo—thanks to a water security program led by *Terracom Saneamento*, the operator of *Águas de Casa Branca*. This result reversed a history of scarcity and ensured continuous access to safe drinking water for the entire population.

To achieve this, the company drilled three artesian wells in the Desterro and Bela Vista neighborhoods and in the district of Lagoa Branca, and it established two alternative water intake points, expanding two kilometers of the raw

water main. These measures increased strategic reserves and guaranteed sufficient flow even during prolonged droughts.

The technical plan was accompanied by environmental investment: Treatment Plant 1 (ETA 1) was equipped with a system to treat sludge from the filters and reuse water from washing processes, reducing losses and improving operational efficiency. The combination of source expansion, infrastructure reinforcement, and water reuse transformed the city's relationship with its supply, strengthening resilience in the face of climate change.

Water reuse as circular economy strategy

RJ • Águas do Rio (Aegea)

Aegea has been actively expanding its operations in sustainable industrial water solutions. Through *Apura*, a business unit established in 2024 focused on water reuse, the company promotes circular economy practices, contributing to natural resource preservation and increasing water availability for the population.

One example of this commitment is the agreements to supply recycled water produced from treated sewage. A flagship project is with Petrobras, at the Boaventura Energy Complex in Itaboraí (RJ). Considered the largest industrial water reuse project in Brazil, it aims to supply the complex's industrial units, requiring expanded sanitation infrastructure and transforming water management in the Rio de Janeiro Metropolitan Region, particularly in São Gonçalo and Itaboraí, which are historically affected by water scarcity and inadequate sewage services.

The project includes building a pipeline to transport reuse water produced from treated effluent at the São Gonçalo and Alcântara Sewage Treatment Plants, operated by Aegea's Águas do Rio. Apura will further treat this effluent for industrial use at Petrobras, replacing potable water and freeing up the equivalent of water for 600,000 people for municipal supply, easing pressure on local water sources.

Another project is with Braskem, supplying its Duque de Caxias (RJ) facility. Through Águas do Rio, Aegea will accelerate by three years the construction of sewer networks and a new WWTP, ensuring basic sanitation for nearby communities. The treated sewage will be used by Apura to produce industrial-grade reuse water, while the plant will also treat Braskem's industrial effluents, creating a closed-loop system that safeguards both people and the environment.

Photo: Courtesy of Aegea





Water quality

Climate change has also significantly affected the quality of water available for abstraction. Intense and concentrated rainfall events increase the load of sediments, nutrients, heavy metals, and diffuse pollutants in water sources. This leads to **higher turbidity, increased dissolved organic matter**, and consequently, **additional difficulties in the treatment processes at Water Treatment Plants (WTPs)**.

During prolonged dry periods, pollutant concentrations in water bodies also rise, promoting the proliferation of cyanobacteria, and increasing the risk of toxins in raw water. This scenario requires additional effort in monitoring and controlling water quality.

The rise in operational costs is an inevitable consequence: higher turbidity and organic loads demand increased dosages of coagulants, oxidants, and other chemical inputs, as well as constant operational adjustments.

Operators also face **additional difficulties in obtaining environmental permits** for new abstractions, discharges, or expansions, as the degradation of raw water quality can limit the volume of water legally available for use.

Private operators have been heavily investing in **actions and technologies** to **mitigate impacts** on water quality

Actions taken by the sector

To mitigate impacts on water quality, private operators have invested heavily in **modernizing Water Treatment Plants (WTPs), implementing multi-barrier treatment systems** capable of handling rapid fluctuations in raw water parameters. The **installation of continuous, real-time water quality monitoring systems**, using sensors distributed across water sources and at WTP inlets, enables fast and precise operational adjustments.

Another area of focus has been the **upgrading of pre-treatment units and coarse solids control**, which help reduce the impact of sediment loads on the clarification processes.

In more critical situations, operators have resorted to the **use of activated carbon** and the **implementation of advanced oxidation processes** to ensure the removal of dissolved organic compounds and toxins.

Additionally, **watershed restoration projects** continue to be developed, focusing on the protection of recharge areas, control of diffuse pollution sources, and reduction of sedimentation in water bodies.

Through these measures, the private sector has demonstrated both adaptability and commitment to maintaining the quality of water supplied to the population, even in increasingly challenging environmental scenarios.

Technology and innovation in basic sanitation

RJ | SP | MG • *Grupo Águas do Brasil*

The Innovation area of *Grupo Águas do Brasil* has been a key pillar in the pursuit and development of cutting-edge technologies, particularly in Artificial Intelligence (AI) and the Internet of Things (IoT). Through its open innovation program, **Torneira Lab**, now in its third edition, the Group has fostered collaboration with startups to modernize internal processes and enhance services provided to the population. This program has played a crucial role in identifying advanced technological solutions that enable more efficient and sustainable water resource management while promoting a culture of learning and innovation.

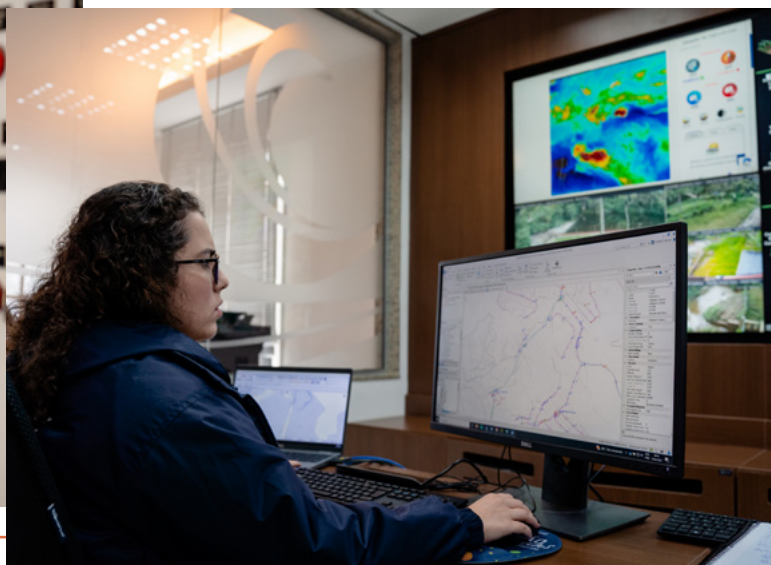
One notable example involved a geolocation challenge leveraging big data and data analytics to cross-reference the company's internal data with external market information. This approach allowed the identification of clients without formal contracts, improved accuracy in pinpointing consumption points, and revealed opportunities for network expansion.

Another highlight is a partnership focused on the automatic analysis of pressure and flow control networks. By enriching data with mathematical models, the solution provided precise recommendations and created a **digital twin** using AI, resulting in more effective and efficient control of the water distribution system.

Collaborations have also targeted energy consumption optimization in sanitation units. Leveraging the intelligence of a deep tech partner, this solution uses machine learning models to determine optimal operation points, enhancing energy efficiency and enabling real-time decision-making.

Finally, the Group partnered with a company specializing in automating meter readings through IoT sensors. These sensors provide real-time monitoring of the water meter network, delivering valuable insights to optimize performance and improve water resource management.

Photo: Courtesy of Grupo Águas do Brasil



Reused water as a pillar to water resilience

SP • *Companhia de Saneamento Básico do Estado de São Paulo (Sabesp)*

Water scarcity, exacerbated by climate change and urban growth, has posed a strategic challenge for the State of São Paulo: how to meet the increasing demand for water from major industrial, commercial, and event hubs without compromising the water sources that supply the population. The solution required sustainable, scalable, and economically viable approaches.

Sabesp has made water reuse a central component of its water security strategies. Produced from treated wastewater using cutting-edge technology, this water meets strict standards for non-potable use in industries, construction, HVAC systems, and urban cleaning. This solution can cost up to 75% less than potable water.

To scale this approach, Sabesp has expanded strategic partnerships: in 2025, it signed agreements with Veolia and Ambipar to develop modular reuse projects with direct network supply in Guarulhos and the Ayrton Senna corridor. It also began supplying 2

million liters per month to the Anhembi District, a major event hub in the capital, reducing costs and adding environmental value to the venue's new phase.

Other clients, such as Santher, Santaconstancia, Conceserv, and Concrebase, have already used reclaimed water for intensive processes. The Aquapolo project at the ABC Petrochemical Complex serves as a benchmark: with a capacity to supply the equivalent of 500,000 people, it serves 14 industrial plants.

Water reuse has the potential to reach 10% of treated wastewater in the São Paulo Metropolitan Region, aligning with international benchmarks such as Singapore and Israel. This advancement frees up water resources for human consumption and places Sabesp as a leader in a new era of integrated water management—delivering environmental, economic, and reputational benefits. Once an alternative, reused water has now become a strategic solution.



Photo: Courtesy of Sabesp



Investment in loss reduction and operational control

MG • Águas de Pará de Minas (Grupo Águas do Brasil)

Águas de Pará de Minas has invested in loss reduction since the concession was established in 2015. Today, the company stands out nationally, with only 14.4% water loss in distribution—well below the national average of 37.78%. This result reflects daily work carried out through the *Água de Valor* program, which monitors the system in real time.

Over the years, the concessionaire has implemented full metering across its service area and continuous monitoring of meter usage time, increasing the accuracy of consumption measurement and reducing losses. The average age of the water meter fleet was reduced from nearly six years in 2015 to 3.4 years in 2024, well below the recommendation of Inmetro (Brazil's National Institute of Metrology, Quality and Technology).

Another key investment was the implementation of autonomous pressure control in operations.

This initiative established communication via the internet between the Operational Control Center (CCO), operational units, and pressure points through a Programmable Logic Controller (PLC). By maintaining adequate pressure in the water supply network, this system promotes energy savings and reduces maintenance of both pipes and equipment. Proper pressure management also results in fewer network bursts and reduces the volume of water lost, particularly through non-visible leaks.

Loss prevention at Águas de Pará de Minas is an ongoing effort based on hydraulic modeling studies that identify improvements needed in the system, ensuring that Pará de Minas remains a benchmark in reducing water waste in distribution. The municipality enjoys 100% treated water supply coverage, and 99.5% of the population has access to sewage collection and treatment.

SANITATION AND CLIMATE CHANGE

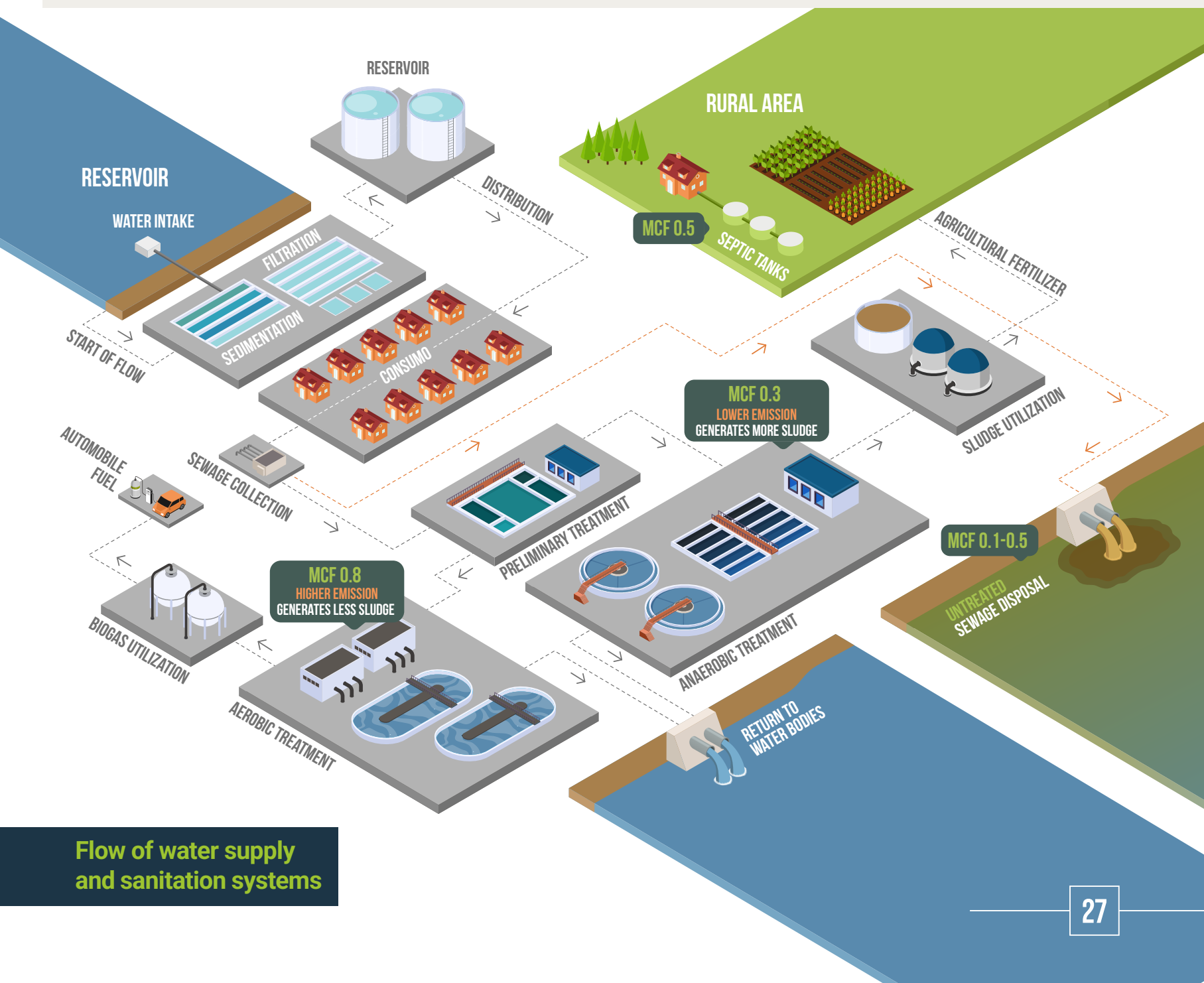


Although water supply and wastewater systems involve long distances and multiple processes—connecting raw water intake, treatment, storage, and distribution—**greenhouse gas emissions** occur mainly during wastewater treatment, which, after collection, is directed to the treatment plant before being discharged into the receiving water body.

After preliminary/primary treatment, wastewater treatment plants may adopt predominantly aerobic processes, which consume more energy and generate more sludge but with lower emissions, or anaerobic processes, which produce methane (CH_4). This methane can

either be converted into CO_2 through controlled combustion or used as biofuel where feasible. Sludge may also undergo treatment, such as anaerobic digestion, which generates methane emissions but also enables subsequent energy recovery from biogas. After this stage, sludge can be applied in agriculture, contributing to the biological cycle of the circular economy.

When wastewater is not treated, in addition to compromising water quality and its multiple uses, it results in direct emissions into the environment. Consequently, the priority is the **universalization of services**, with solutions that expand coverage and promote environmental benefits.



Flow of water supply and sanitation systems

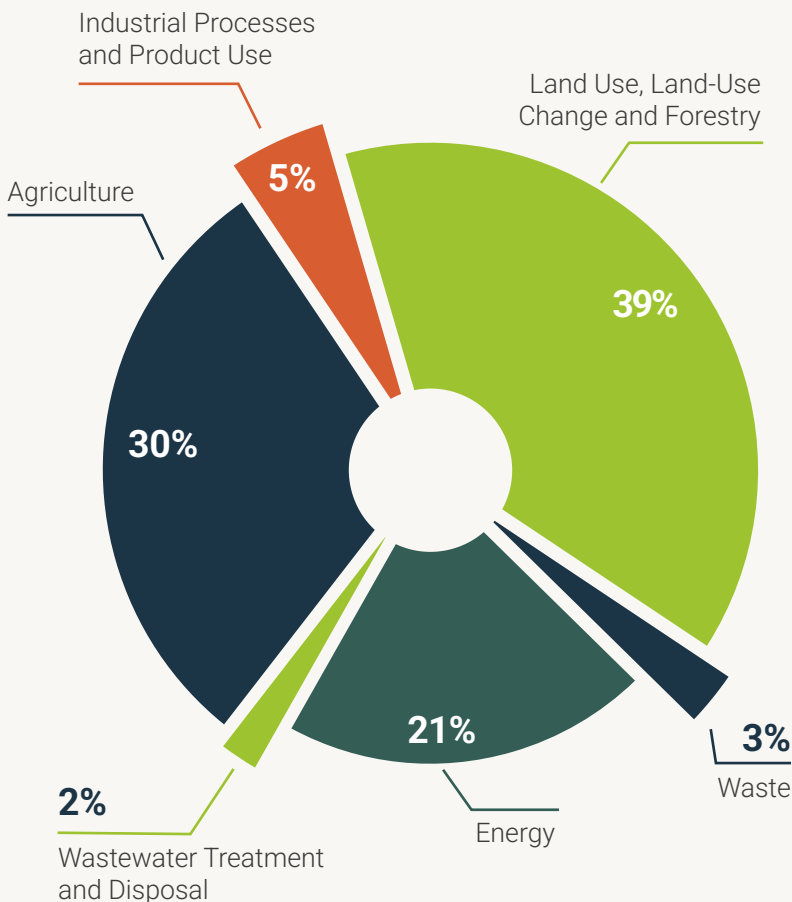
Sanitation: low emissions, big solution

The water and sanitation sector holds a strategic position in Brazil’s climate agenda. While its primary mission is to **ensure public health, quality of life, and environmental protection**, its share in national greenhouse gas (GHG) emissions is proportionally very low when compared to other sectors of the economy.

Even when considering the entire operational cycle—including water intake, treatment, distribution, as well as wastewater collection and treatment— sanitation remains a **marginal sector in terms of absolute emissions**.

According to the National Emissions Registry System, **water and wastewater** activities accounted for only 2% of **national greenhouse gas emissions** in 2022

DISTRIBUTION OF EMISSIONS BY SECTOR



Source: National Emissions Registry System – SIRENE (MCTI)

Yet the sector has acted responsibly, adopting practices and technologies that contribute to reducing its carbon footprint. The **energy recovery from biogas** at Wastewater Treatment Plants is already a reality in private operations, transforming an environmental liability (methane) into a renewable energy source.

In addition, several utilities have implemented **energy efficiency programs**, including the replacement of obsolete equipment, automation of pumping systems, and pressure control in water distribution networks, thereby reducing the specific energy consumption per cubic meter of treated water or wastewater. At the same time, the sector has expanded the use of renewable sources through the production and procurement of clean energy, resulting in lower indirect emissions.

Other initiatives by private operators involve the **management of sludge** generated at treatment plants, with sustainable solutions to transform this waste into a resource. Composting has been used to produce organic fertilizer with potential agricultural applications and for the recovery of degraded areas, contributing to the strengthening of the circular economy. There are also initiatives focused on generating energy from sludge. Some of these actions include:

Wastewater as a source of clean energy

SP • *Companhia de Saneamento Básico do Estado de São Paulo (Sabesp)*

The pursuit of clean energy sources and solutions that promote sustainability has become urgent considering global climate change. In the sanitation sector, this need aligns with the imperative to operate wastewater systems according to circular economy principles. Domestic wastewater, although traditionally viewed as waste, holds significant energy potential that is often lost. Transforming this environmental liability into a resource represents a technological, innovative and sustainable solution.

In April 2018, Sabesp implemented a Biogas Upgrading System at the Franca Wastewater Treatment Plant (SP), converting the gas generated during wastewater treatment into biomethane, a highly efficient renewable fuel. The biogas

is purified, removing impurities such as CO₂ and hydrogen sulfide, and converted into biomethane, which now fuels 40 vehicles in the company's fleet. The Franca plant treats approximately 50 million liters of wastewater per day.

Since the start of operations, the system has produced around 177,000 m³ of biomethane, replacing fossil fuels and generating savings exceeding BRL 700,000. Beyond substantial cost reductions, the project contributes to greenhouse gas emission reductions, placing Sabesp as a national reference in innovation and sustainability in the sector. With technical support from the Fraunhofer Institute (Germany), the Franca project stands out as a practical example of circular energy and environmental commitment.

Photo: Courtesy of Sabesp



Energy management with renewable and traceable sources

RJ | MT | PR | SP • *Iguá Saneamento*

In 2024, *Grupo Iguá* made a significant leap in energy management with the start of operations at a photovoltaic power plant in Janaúba (MG), under a self-generation scheme, increasing the share of renewable and traceable electricity in its business.

With an installed capacity of 50 MW, the plant was leased for 15 years and supplies five of the company's operations: Iguá Rio de Janeiro (RJ), Águas Cuiabá (MT), Paranaguá Saneamento (PR), Sanessol (SP), and Atibaia Saneamento (SP). It is estimated that, by the end of the 15-year period, more than 100,000 tons of greenhouse gas emissions will be avoided.

Grupo Iguá also invests in distributed energy generation across all its operations: approximately 10% of the company's electricity consumption is supplied through such contracts. Combining self-generation and distributed generation, the company

avoided the emission of more than 4,000 tons of CO₂ in 2024, with 96% of the energy consumed coming from renewable sources.

For Iguá Rio, around 90% of operations began to be powered by photovoltaic energy in 2025, with the commissioning of the third exclusive solar plant. Also in 2024, two plants in Cabo Frio (RJ) started generating green energy credits exclusively for Iguá Rio. Each plant produces credits equivalent to 2,300 MWh per year, corresponding to the annual consumption of 2,132 households.

The photovoltaic matrix contributes to reducing the water footprint of energy production and supports the provision of basic sanitation services. To generate the same 2,300 MWh per year, a hydroelectric plant would require, on average, 2.3 billion liters of water, equivalent to 460,000 5,000-liter water tanks.



Photo: Courtesy of Iguá Saneamento

Solar energy as a driver of operational sustainability

SP • *Companhia de Saneamento Básico do Estado de São Paulo (Sabesp)*

As one of the largest sanitation companies in the world, Sabesp is also among Brazil's biggest energy consumers. With thousands of facilities requiring electricity to pump water and transport sewage, reducing environmental impact and operational costs has become a strategic priority. The need to ensure energy resilience and mitigate emissions has posed a challenge for the Company: aligning its operations with the energy transition and global climate commitments.

In response, Sabesp implemented the Photovoltaic Energy Generation Program, an initiative designed to expand the use of renewable sources. The program plans the construction of 44 solar plants, with a total distributed generation capacity of 60 MW. Once completed, it will supply 60% of low-voltage energy consumption—equivalent to 4% of the Company's total energy use. The plants are primarily installed at wastewater treatment plants (WWTPs), leveraging existing infrastructure and optimizing space.

In 2025, three plants were commissioned in Pederneiras (3 MW), São Manuel (2 MW), and Pindamonhangaba (1 MW), collectively providing enough energy to supply approximately 5,400 households per month. With this, Sabesp's solar portfolio reached 31 operational units, totaling 41.1 MW of installed capacity—equivalent to the consumption of 35,330 households. The total investment in the new units exceeded BRL 23 million, with an additional BRL 150 million planned to complete the program by the end of 2025.

Distributed solar generation already supplies around 1,200 Sabesp operational facilities. The use of a perennial and clean energy source strengthens the company's energy resilience considering climate change and energy generation impacts, while positioning it as a benchmark in ESG practices. It also contributes to the diversification of the energy matrix and the efficient use of natural resources. This represents a model of operational transformation with a direct impact on the financial, environmental, and climate sustainability of basic sanitation.

Photo: Courtesy of Sabesp





Sludge and waste management for composting

SP • *Companhia Saneamento de Jundiaí*

Waste management, particularly of sludge generated at Wastewater Treatment Plants (WWTPs), represents a major challenge for the sanitation sector. Its composition, characteristics, and the restrictions imposed by disposal sites make disposal a complex issue with operational, environmental, and economic implications, demanding efficient management.

Seeking a sustainable solution to address the difficulty of disposing the large volume of sludge at the main landfills in the state of São Paulo, CSJ adopted composting as a definitive method for sludge management. Approximately 3,000 tons of sludge are removed from the system monthly, totaling over 800,000 tons of dewatered sludge since the beginning of operations.

The composting process combines sewage sludge with other organic residues of agronomic interest, producing a Class B organic fertilizer registered with the Ministry of Agriculture, Livestock, and Supply (MAPA) and suitable for unrestricted use. In this way, the waste that once represented a problem is transformed into a valuable product, returning organic matter to the soil in line with circular economy principles.

In addition to significantly reducing the volume of waste sent to landfills, composting contributes to mitigating greenhouse gas emissions—providing a solution that combines operational efficiency with sustainability.

Sludge transformation and waste management

RJ • Águas de Nova Friburgo (Grupo Águas do Brasil)

Águas de Nova Friburgo, the water and sewage service provider for the municipality of Nova Friburgo (RJ), has implemented pioneering projects that combine environmental responsibility, social impact, and operational efficiency.

Since July 2021, the company has been running the **Projeto Lodo de Valor** (Valuable Sludge Project), which aims to responsibly manage the sludge generated at wastewater treatment plants (WWTPs). The sludge undergoes a transformation process to become a nutrient-rich fertilizer.

The resulting material is applied in public squares, reforestation initiatives, and in the cultivation of native Atlantic Forest seedlings at the company's own training nursery. The environmental and social significance of the project was recognized in 2024 with the **IV Environmental Award** from the State Environmental Institute (INEA), highlighting its contribution to environmental conservation and the promotion of a circular economy.

In addition, the company expanded its sustainability efforts through the **Projeto Lixo Zero** (Zero Waste Project), focused on reducing, reusing, and recycling solid waste. The initiative enabled the construction of an Eco Point, distribution of selective waste collectors, awareness campaigns, staff training, internal audits, and partnerships with local cooperatives and seamstresses.

The results have been significant: 50.4% of waste was diverted from landfills, over 6.8 tons of materials were recycled, and 2.7 tons of organic waste underwent composting. These actions also reduced more than 16 tons of CO₂ equivalent

emissions and generated income for recyclers and local seamstresses. The project created direct jobs and promoted the upcycling of old uniforms into sustainable gifts.

By turning environmental challenges into opportunities for innovation and social development, Águas de Nova Friburgo reinforces its position as a reference in environmental management within the Águas do Brasil Group, with potential for replicating these practices across other operational units.



Operational efficiency to ensure water supply

SC • *Guabiruba Saneamento (Norte Saneamento)*

The challenge of maintaining uninterrupted water supply, even during peak demand periods, led the operations team in Guabiruba (SC)—a municipality of approximately 24,000 inhabitants in the Vale do Itajaí—to develop a robust water loss reduction plan. In a state like Santa Catarina, which boasts one of the highest water coverage rates in the country but still experiences average losses exceeding 35% (SNIS, 2022), initiatives such as those implemented in Guabiruba serve as a regional and national benchmark.

The water loss reduction plan in the city included the installation of pressure and reservoir level monitoring points, training of local personnel for fraud detection, replacement of outdated water meters, and adjustments in the distribution network. A total of 1,500 water meters with expired lifespans or inaccurate performance were replaced—a critical step to ensure fair billing,

recover revenue, and gain precise insights into consumption patterns.

This continuous, long-term project involves systematic actions throughout the contractual period. The results are already notable: the Water Supply Continuity Index (ICA) rose from 92.78% in 2021 to 98.27% in 2024, approaching operational excellence. Even more significant was the reduction in the Distribution Loss Index, from 46.14% to 22.89% in the same period—a level considered high performance in the sector.

Operational efficiency in water and sanitation goes beyond visible infrastructure: it requires technical management, planning, technological application, and close alignment with local realities. Combating water losses is not only about conserving resources; it also improves service quality, ensures financial sustainability, and enhances the quality of life for the population, regardless of city size.



Photo: Courtesy of Norte Saneamento



Clean energy, water reuse, and waste management

SP • SESAMM (GS Inima Brasil e Sabesp)

Located in Mogi Mirim (SP), SESAMM, operated through a partnership between GS Inima Brasil and Sabesp, has been implementing solutions aimed at mitigating greenhouse gas emissions and enhancing the value of natural resources, in line with GS Inima Brasil's climate strategy.

A pioneer in solar energy use within the sector, SESAMM has maintained a photovoltaic plant since 2019. Currently, approximately 37% of the electricity consumed in operations is generated on-site, through 1,716 modules with a total installed capacity of 730.98 kWp. The facility holds ISO 50001 energy management certification—the first of its kind in the Brazilian sanitation sector.

Another crucial focus is sludge management: over 60% of the volume generated in sewage treatment

is directed to composting, avoiding landfill disposal and promoting the circular economy by converting waste into agricultural inputs.

SESAMM also stands out for intelligent water management. In 2023, 87% of water used in operations came from reuse. This water is treated and licensed by Cetesb for non-potable urban uses, such as irrigation of green areas and street cleaning, contributing to the preservation of water sources and adaptation to climate change.

Through innovative practices and tangible results, SESAMM demonstrates that the sanitation sector can play an active role in combating the climate crisis and fostering a more sustainable future.

Sludge reuse as fertilizer

SC • *Sombrio Saneamento (Norte Saneamento)*

Proper disposal of sludge generated during wastewater treatment remains a major challenge for the sanitation sector, especially given the need to expand sewage treatment coverage in the country. In Sombrio, a municipality of approximately 30,000 inhabitants in southern Santa Catarina, the concessionaire *Sombrio Saneamento* has implemented an economically viable and environmentally responsible solution for this residue. The sludge produced by the local wastewater treatment plant (WWTP), classified as Class IIA – Non-Inert (according to ABNT NBR 10.004), is now reused through the “Sludge as Fertilizer” project, developed in partnership with *Composul Compostagem*.

The technology employed is the German GORE® Cover system, which ensures a controlled and environmentally safe composting process, in compliance with the National Solid Waste Policy (Law No. 12.305/2010). Launched in October 2024, the

project had already directed 1,365.87 tons of sludge to composting by April 2025, with an expected total of 2,000 tons by the end of the year, significantly reducing the volume of waste sent to landfills.

In addition to environmental benefits, such as the valorization of organic matter and the mitigation of greenhouse gas emissions, the initiative has reduced waste management costs by 15%. The final compost, regulated by environmental authorities and registered with MAPA as “Class B Organic Fertilizer” (SC 003269-7.000001), is applied to crops, enhancing soil health and supporting agricultural development.

Transforming sludge into fertilizer closes the organic matter loop, provides a new purpose for what was previously discarded, and reinforces *Sombrio Saneamento*’s commitment to circular economy principles, sustainability, and efficient urban waste management.



Photo: Courtesy of Norte Saneamento



Sustainability and technology for continuous water supply

SP • Águas de Potim (Terracom Saneamento)

The new Water Treatment Plant in Potim (SP) is now fully operational, and it has already earned the municipality AMVALE's Responsible Management Award. With the capacity to treat five million liters per day, the plant eliminates the historical dependence on external sources and on wells with concerning ammonia levels, establishing water self-sufficiency and enhancing local potential.

By ensuring a continuous supply of treated water, *Terracom Saneamento* reduces health risks,

stimulates the economy, and paves the way for new industrial and real estate investments. The qualitative leap translates into measurable social benefits: improved public health, increased property values, and expanded employment opportunities.

Potim thus emerges as a benchmark for basic sanitation in the Vale do Paraíba, demonstrating that the combination of careful planning, technical expertise, and strategic vision can transform a municipality's trajectory in a short period.



New legal framework presents challenges

Brazil has been experiencing a time of accelerated expansion in sanitation infrastructure, in response to the universalization targets established by the New Legal Framework (Law No. 14,026/2020).

The process of universalization will require the large-scale expansion of sewerage networks, the construction of new wastewater treatment plants (WWTPs), and the enhancement of water supply systems. As an unavoidable outcome, there will be an **absolute increase in sectoral greenhouse gas emissions**, even if the emission intensity per unit of service delivered— e.g. per cubic meter of treated wastewater—remains low or is further reduced through the deployment of cleaner and more efficient technologies.

It is important to understand that the increase in these emissions is not the result of inefficient management, but rather a direct and unavoidable consequence of the

expansion of sanitation service coverage—a legal and a socially necessary obligation measure. The environmental cost of failing to advance towards universalization is infinitely greater, since the lack of sanitation currently represents one of the main sources of degradation of the country's water resources.

Besides mitigating pollution, **sanitation** constitutes a **foundational measure for climate adaptation**. By reducing exposure to waterborne diseases, safeguarding water sources, and strengthening urban water security, the sector plays a pivotal role in enhancing community resilience and advancing adaptation pathways to cope with the adverse impacts of climate change.

Within this context, important considerations emerge regarding the design and implementation of future climate policies, such as the regulation of the Brazilian Emissions Trading System (SBCE). While the sanitation sector fully aligns with the global commitment to reducing GHG



By expanding sewage collection and treatment, the sector is not only fulfilling a legal obligation, but also contributing to the depollution of water bodies, the reduction of health risks, and the strengthening of Brazilian cities' adaptive capacity considering extreme climatic events.

Sanitation is, by its very nature, a **foundational climate solution**. Its expansion and modernization are preconditions for a more resilient, healthier and environmentally balanced Brazil. This trajectory, initiated with the New Legal Framework, represents a unique opportunity to promote sustainable urban development that aligns social inclusion, environmental protection, and adaptation to emerging climate conditions.

Consolidating this path requires recognition by all stakeholders involved in public policy formulation that the universalization of sanitation is a **key driver of sustainability**, with long-term benefits for the environment, public health and overall quality of life.

emissions, it is crucial that climate policies consider the sector's **operational and legal** specificities. This ensures that such measures do not inadvertently create financial, operational, or regulatory obstacles to the achievement of universal access to sanitation services.

There is a real risk that poorly calibrated carbon pricing mechanisms could end up penalizing precisely the sector that is being called upon to expand its operations to meet legally **mandated coverage targets**. This is a sector that up to now has been responsible for only a minimal share of national emissions and has proactively implemented a variety of **technological solutions** to mitigate its impacts.

This reality underscores the need for climate discussions in Brazil to consider the **particularities of the basic sanitation sector** as an essential service for public health, water security, and the preservation of environmental resources.

The **environmental cost** of not advancing universal access is enormous, as the lack of sanitation represents **one of the main** sources of water resource degradation in the country

04

AGENDA FOR SUSTAINABLE UNIVERSALIZATION



To ensure that the sanitation sector continues to contribute to environmental sustainability and climate adaptation, without compromising the legally mandated universalization targets, ABCON SINDCON has developed an **Agenda for Sustainable Universalization**. Each of the **10 following proposals** addresses the challenges and considerations outlined in the preceding chapters.

PROPOSAL 1

PRIORITIZE UNIVERSALIZATION AS THE CENTRAL GOAL OF CLIMATE AND ENVIRONMENTAL REGULATORY POLICIES

RATIONALE:

The universalization of sanitation is a legal mandate, with deadlines and indicators established in the New Sanitation Legal Framework (Law No. 14,026/2020). Ongoing climate and environmental regulatory policies, including the Brazilian Emissions Trading System (SBCE), must recognize this priority to ensure that new requirements do not compromise the expansion of services.

Although the sanitation sector has a low share of national emissions, it could face significant impacts if emission targets or disproportionate restrictions are applied—such as mandating specific technologies without considering local technical and economic feasibility. **Prioritizing universalization** is essential to maintain a balance between environmental and social commitments.

REQUIRED INSTRUMENT:

Incorporation of this guideline into the SBCE regulation and national climate policy documents.

PROPOSAL 2

ESTABLISH A SECTORAL CARBON CREDIT MECHANISM FOR SANITATION

RATIONALE:

The sanitation sector has the potential to generate **carbon credits** through projects that reduce methane emissions and improve water quality. A sector-specific mechanism, including the development of methodologies that recognize the sector’s characteristics, would allow the environmental benefits of sanitation to be acknowledged and monetized, thereby encouraging investments in low-carbon technologies.

This measure would also contribute to keeping tariffs affordable, preventing the full costs of decarbonization from being passed on to users.

REQUIRED INSTRUMENT:

Creation of a sectoral program within the SBCE framework.

PROPOSAL 3

STANDARDIZE CRITERIA FOR SLUDGE TREATMENT AND APPLICATION

RATIONALE:

Sludge generated in Wastewater Treatment Plants (WWTPs) is a byproduct with potential for energy recovery and agricultural use. However, the lack of clear regulation and the diversity of state-level criteria hinder proper disposal, often resulting in landfill disposal, which increases costs and wastes resources. It is essential that state-level criteria align with federally established guidelines to ensure regulatory consistency and legal certainty.

Standardizing technical and sanitary criteria at the national level will enable the advancement of more sustainable solutions, such as energy recovery and safe agricultural use, in line with international best practices.

REQUIRED INSTRUMENT:

Approval and amendment of resolutions through CONAMA, establishing national guidelines for the diverse uses and disposal of sludge from Water Treatment Plants (WTPs) and Wastewater Treatment Plants (WWTPs).

PROPOSAL 4

REGULATE THE USE OF ALTERNATIVE WATER AND SEWAGE SOLUTIONS

RATIONALE:

Alternative solutions, such as individual wells, water trucks, septic tanks, or decentralized systems, play a relevant role in ensuring access to sanitation in areas where conventional infrastructure implementation is technically unfeasible. These arrangements can be strategic to serve isolated populations, low-density territories, or emergency situations of water scarcity.

However, it is essential that regulations and regulatory guidelines recognize that such solutions do not replace the obligation of universal access through structured public networks. Their use should be limited to specific contexts, with technical criteria, sanitary control, and clear guidelines regarding responsibility, operation and monitoring.

At the same time, **the adoption of decentralized solutions should not become a permanent alternative** outside the framework of proper planning and service provision. These solutions must be integrated into sanitation plans and used only when the extension or operation of the network is demonstrably unfeasible—always with mechanisms for supervision, quality control, and continued service delivery.

REQUIRED INSTRUMENT:

Inclusion in state regulatory and environmental standards.

PROPOSAL 5

REGULATE THE REUSE OF NON-POTABLE WATER FROM TREATED SANITARY EFFLUENTS

RATIONALE:

The reuse of water from treated sanitary sewage is a strategic solution to enhance water security, reduce pressure on water sources, and promote a circular economy within the sanitation sector. It constitutes a viable and sustainable alternative for non-potable applications, such as industrial processes, landscape irrigation and street cleaning.

The production and supply of reused water should preferably be carried out by the sanitary sewage service provider. This is justified by the fact that reuse is a natural and integrated stage of the treatment process, and it is expressly recognized in Law No. 11,445/2007 as part of the public service. Preferential attribution ensures traceability, sanitary control, environmental safety, and the use of infrastructure already licensed and operated by qualified agents.

This guideline does not imply exclusivity but aims to guide the establishment of more efficient and sustainable operational arrangements, avoiding overlapping functions and promoting integration between the production and final disposal of reused water. By allowing the reinvestment of ancillary revenues into the system itself, reuse also contributes to the sector's economic and financial sustainability and advances universal access targets.

Reuse expansion should be stimulated where there is technical feasibility and demand for non-potable uses, based on flexible contractual models, consultation with local providers, and recognition of the associated environmental, operational, and social benefits.

REQUIRED INSTRUMENT:

Approval through specific legislation (Bill No. 10.108/2018) and incorporation into regulatory standards.

PROPOSAL 6

ACCELERATE LAND REGULARIZATION PROCESSES FOR SANITATION PROJECTS

RATIONALE:

Many sanitation projects face land-related obstacles, with limited access to areas needed for the installation of networks, WWTPs, and reservoirs. The slow pace of expropriation and land regularization processes has been one of the main bottlenecks to infrastructure expansion. It is essential to **establish mechanisms that expedite these processes**, ensuring legal certainty and enabling investments.

REQUIRED INSTRUMENT:

Modification of state land regularization regulations.

PROPOSAL 7

ESTABLISH CRITERIA FOR LICENSES AND PERMITS FOR DISCHARGE OF TREATED SANITARY EFFLUENTS INTO DEGRADED URBAN RIVERS

RATIONALE:

Many urban rivers already exhibit high levels of degradation. Nevertheless, obtaining permits for the discharge of treated effluents remains challenging, even when the effluents comply with legal standards. The lack of differentiated criteria for these scenarios hinders the expansion of sewage collection and treatment in densely populated urban areas, measures that would significantly contribute to river depollution.

Establishing **specific permitting criteria for degraded water bodies**—considering all relevant stakeholders and basin usage—is essential to ensure the advancement of sanitation projects without jeopardizing environmental quality.

REQUIRED INSTRUMENT:

Revision of the National Water Resources Council regulations and ANA guidelines.

PROPOSAL 8

ADJUST THE ENVIRONMENTAL IMPACT CLASSIFICATION OF THE SANITATION SECTOR

RATIONALE:

Sanitation projects can be assigned an environmental impact classification that is disproportionate, comparable to potentially polluting undertakings—resulting in increased bureaucracy, higher costs, longer implementation timelines and slower investment.

It is necessary for legislation to recognize **the environmentally positive nature of sanitation** and establish classification criteria better suited to its profile, distinguishing it from projects with actual degradation potential.

REQUIRED INSTRUMENT:

Revision of CONAMA regulations and inclusion of specific criteria for sanitation in both federal and state legislation.

PROPOSAL 9

FLEXIBILIZE QUALITY PARAMETERS IN EXTREME OR TRANSITIONAL SITUATIONS

RATIONALE:

Extreme climatic events, such as prolonged droughts or floods, can significantly alter the quality of raw water, requiring emergency adjustments in treatment processes. Additionally, sewage expansion projects often undergo transitional phases in which increased influent loads to wastewater treatment plants require operational adaptations.

The establishment of **specific criteria for the temporary flexibilization of quality parameters**—technically justified, and under the oversight of regulatory and environmental authorities—is essential to ensure service continuity without compromising public health or the environment.

REQUIRED INSTRUMENT:

Revision of CONAMA resolutions and development of specific regulations by the state environmental agencies.

PROPOSAL 10

CREATE CREDIT LINES FOR LOW-CARBON TECHNOLOGIES IN SANITATION

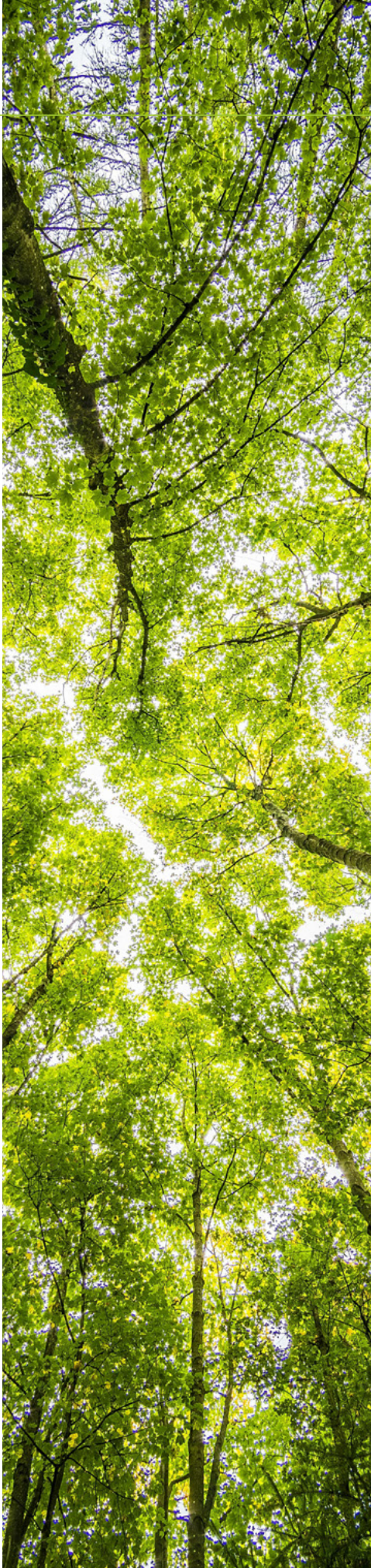
RATIONALE:

The transition to a low-carbon model in the sanitation sector requires investment in more efficient and sustainable technologies, such as biogas capture and utilization systems, improvements in energy efficiency, and modernization of treatment processes. However, these solutions often involve high costs, which impact the economic and financial balance of operations. Without incentive or compensation mechanisms, there is a risk that these costs will be fully passed on to users, undermining affordability and the feasibility of universal access.

In this context, it becomes clear that the economic sustainability of the transition depends on appropriate financial instruments. Current **financing conditions** are not always compatible with the needs and specificities of sanitation service providers. The creation of credit lines with favorable terms is essential to enable the large-scale adoption of these technologies without endangering the balance between innovation, accessibility and service expansion.

REQUIRED INSTRUMENT:

Creation of dedicated lines of credit at BNDES, FINEP, and national climate funds.



Conclusion

Brazil has been experiencing a crucial moment to advance the universalization of basic sanitation services while simultaneously consolidating its commitment to the global climate agenda. **Challenges are complex and require integrated responses** that recognize the essential role of sanitation as a driver of public health, social inclusion, environmental protection, and climate change adaptation.

The **private sector** has demonstrated a strong capacity for investment, technological innovation, and environmental responsibility, even considering a challenging context of accelerated coverage expansion and regulatory transformations. As evidenced by the cases and initiatives presented in this document, the mitigation measures already implemented, along with ongoing initiatives, indicate that it is possible to advance toward increasingly efficient and sustainable operations with reduced emission intensity.

For Brazil to achieve its universalization targets, it is essential that climate and regulatory policies consider the **particularities of the sanitation sector**. The proposals presented in this Agenda reflect a collective effort to build a pathway that is at once environmentally responsible, socially equitable, and economically viable.

Basic sanitation is a fundamental component of the country's climate solution. Through dialogue, planning and appropriate regulation is possible to ensure that the progress achieved in recent years will be consolidated, ensuring a more resilient, inclusive and sustainable future for the entire Brazilian population.

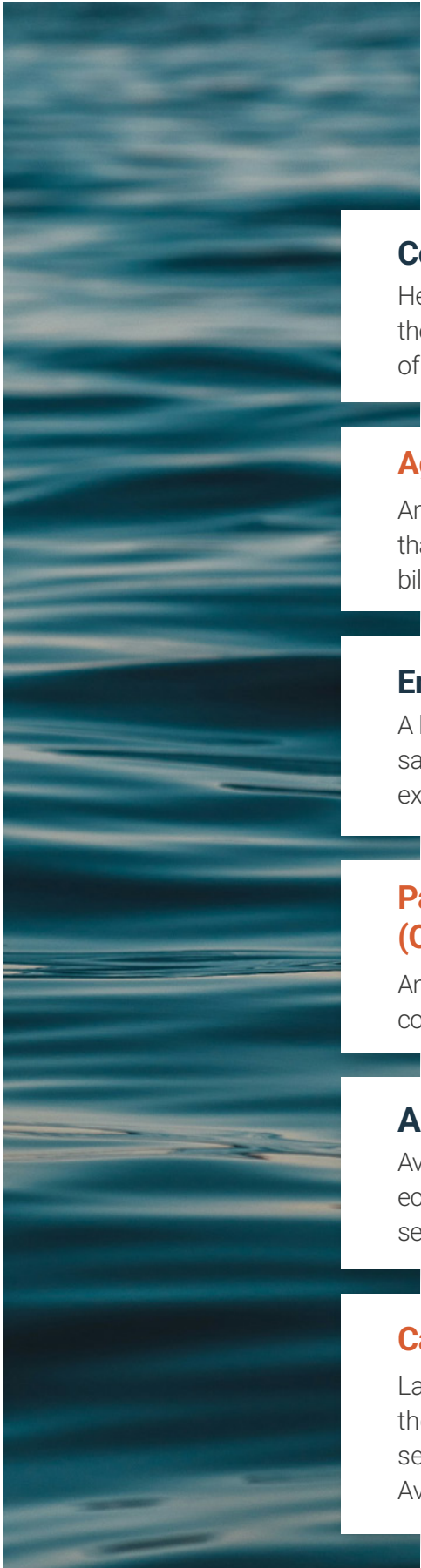


About us | Meet ABCON SINDCON

Established in 1996, the **National Association and Union of Private Water and Wastewater Concessionaires (ABCON SINDCON)** comprises 12 member companies and their affiliated concessionaires. As the institutional representative of private operators in the sanitation sector, the association seeks to strengthen their role as key stakeholders in advancing sectoral development. Its mission is to promote greater participation of private operators in Brazil's sanitation framework, consolidating them as vectors of social and economic progress and reinforcing their strategic contribution to the country's pursuit of universal access to water and wastewater services.

Meet the member companies of ABCON SINDCON





OUR EVENTS AND PRODUCTS

ABCON SINDCON offers a series of products designed to provide qualified and up-to-date information on the sanitation sector. Below are some of our key initiatives:

Conexões Saneamento (Sanitation Connections)

Held in Brasília, the event brings together the country's leading voices — authorities from the Government, experts, market leaders, and the press — to discuss the present and future of sanitation. A forum for dialogue between the public sector, private sector, and society.

Agenda Legislativa do Saneamento (Sanitation Legislative Agenda)

An annual publication that provides lawmakers with updated input on bills under discussion that impact the provision and expansion of water and wastewater services nationwide. Each bill is analyzed by the association, which also issues technical notes.

Encontro Nacional das Águas - ENA (National Water Meeting)

A biennial congress that brings together experts to discuss the main topics affecting sanitation and its operations. During the event, private concessionaires present successful experiences in various areas, from social responsibility to regulation.

Panorama da Participação Privada do Saneamento (Overview of Private Involvement in Sanitation)

An annual publication that compiles key sector data related to the activities of private sanitation concessionaires. Once released, it is available for consultation on the association's website.

ABCON Data

Available on the association's website, this tool provides systematic monitoring of the main economic and social variables affecting the sanitation sector. It is organized into the following sections: Economic Outlook, Operating and Construction Costs, and Social Indicators.

Calculadora de Custos em Saneamento (Sanitation Cost Calculator)

Launched in 2021, this is an automated system that captures state-based tables from the National System of Prices and Indices for Civil Construction (Sinapi), for pricing services, projects, and sector works, estimating costs with a high level of detail. Available by subscription for non-members of ABCON SINDCON.

ABCON SINDCON TEAM

Saneamento pelo Clima: Agenda ABCON para a universalização sustentável

(Sanitation for Climate: ABCON Agenda for Sustainable Universalization) is a publication of ABCON SINDCON.

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