

INFOSYS LEADING THE WAY IN WATER SUSTAINABILITY IN INDIA

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BACKGROUND

Water availability is a serious concern across the globe. In January, 2015, the World Economic Forum ranked water crises as the top global risk in their '10th global risk report', an annual survey among nearly 900 leaders in politics, business, and civic life about the world's most critical issues. With India and Asia being the most water stressed zones, it is essential to manage water efficiently in these zones. India continues to be trapped under severe water crisis and if constant measures to conserve water are not undertaken, it will soon be categorized as a water-stressed economy.

At Infosys, fresh water consumption is solely for the purpose of human sustenance and not for production purposes. Hence, we, in Infosys, do not significantly impact water sources. Recognizing the grave issues of water scarcity which our country is facing, Infosys started its efforts to manage water efficiently in 2008 when the Green Initiatives Team was formed.

The increasing unreliability in availability of fresh water due to climate change in cities in India where Infosys operates was also a key driver to implement adaptation and mitigation strategies to reduce our water consumption. Infosys is an IT services and consulting company and the main consumption of water is in our office buildings, food courts and employee care centers.

Our water conservation strategies revolve around supply and demand side of water consumption with a combination of technology and employee sensitizing strategies. As a result, we have been able to significantly reduce our per capita fresh water consumption across our campuses in India which has also fetched us benefits like reduced operational costs and reduced dependence on municipal supply of water. This is also minimizing our operational business risks and at the same time enhancing water access to others, leading to



Fig 1: Pressure compensating aerators (Left), Key valve system (Top Right), Waterless urinal (Bottom Right)

the betterment of society.

OBJECTIVE

Infosys has set a goal to reduce the per capita fresh water consumption by 5% year per year from 2009 onwards with 2008 as the baseline year. The objective of our efficient water management initiative is to reduce the fresh water consumption of Infosys campuses in India. In addition, Infosys is well aware of the daunting challenges posed by water scarcity not only to our country but also globally. Thus, we are committed to save and preserve this precious resource and ensure that more amount of water is available for others to use.

DESIGN STRATEGIES

We are working towards making our

campuses water-sustainable. All our new buildings are designed with the most optimal standard of fresh water requirement i.e. 16 liters per capita per day (LPCD), which is nearly 1/3rd of the requirement of the National Building Code. This has been achieved with the use of water efficient fixtures, innovative wastewater treatment technologies, rainwater harvesting and installing smart water meters for continuous monitoring of consumption data.

1. Water efficient fixtures

Pressure compensating aerators (PCA): We have installed more than 25,000 PCAs in water faucets across all campuses during fiscal year 2015. PCAs provide a constant flow rate of 0.5 gpm (1.9 lpm) over variable

pressures optimizing water use to a great extent.

Waterless urinals: We have installed waterless urinals in some of our campuses. Waterless urinals look very much like conventional urinals in design and can be used in the same manner. However, waterless urinals do not require water for flushing.

At Infosys, about 290 waterless urinals have been installed in various campuses across location in our new buildings. We plan to install this technology in all our new buildings and retrofit existing buildings across India.

Key-System in urinals: We have retrofitted existing urinals systems with waterless urinals by installing key valves. Key valves enable the existing urinal system to be waterless. Over 800 key valves have been installed in campuses. Waterless Urinals and key valves do not require water for flushing, thereby reducing water consumption, and related energy use for pumping and treating water.

2. Wastewater Recycling

The entire waste water generated in our campuses is treated at our sewage treatment plants. Recycled water is used for landscaping, cooling, and flushing within our campuses. Dual plumbing system is in place to provide separate water piping for the supply of potable and non-potable water (treated waste water). The water quality is monitored regularly to applicable norms, ensuring good health and safety to the employees. Use of STP treated water is optimized through dual-flush toilets and sensor-based urinals.

3. Rain Water Harvesting

We harvest rainwater for the purpose of increasing the groundwater levels and for potable purpose. This is done through rooftop rainwater harvesting and deep-well injection systems. Rainwater from the roof is directed and stored in an underground collection tank, filtered, treated, and then used for domestic purposes. In fiscal year 2015, 42 per cent of the freshwater requirements of one of our buildings in Bangalore was met from harvesting rainwater during the monsoon months.

Rainwater is also collected and directed



Fig 2: Membrane Bio-Reactor sewage treatment plant in Infosys Mysore campus

deep into the ground through injection wells, thereby increasing the groundwater table. We have installed a total of 103 deep-injection well systems, having a total capacity of about 5.1 million liters per day, for groundwater recharge across different campuses in India. During this fiscal, we have constructed 21 deep-well injection systems in our Pune campus, 19 in our Bangalore campus and 15 in our Chandigarh campus to maximize water sequestration.

In addition, we have also constructed lakes across our campuses to harvest rainwater. Till date, we have constructed about 25 lakes in our campuses, having a total capacity of more than 250 million liters.

4. Preventing Water Leakages

We have undertaken retrofitting of water piping to eliminate leakages and minimize water wastage. Conventional polyvinyl chloride (PVC) pipes / GI Pipes for water supply have been replaced with medium-density polyethylene (MDPE) pipes / High density polyethylene (HDPE) pipes. These pipes require less number of fittings and have long life. On the other hand, conventional pipes require multiple fittings and last only for 10-15 years. MDPE/HDPE pipes have low maintenance as compared to PVC pipes and can be easily installed in a cost-effective manner. MDPE/HDPE

pipes do not rust and are corrosion resistant even in adverse soil conditions, thereby eliminating the scope of water leakages to a great extent.

5. Smart Water Metering

We have also installed smart water meters in our campuses to ensure continuous monitoring of water consumption data in real-time. These smart meters have enabled us to identify areas of wastage, take immediate corrective action and optimize our water use to a great extent.

6. Employee Engagement

We are directing our efforts to inculcate a culture in our organization wherein our employees are sensitive towards the grave environmental issues that the world is facing today. Thus, we are constantly engaging our employees in our water conservation initiatives to address these challenges.

We are constantly working with our employee driven eco-clubs across our campuses in India to spread awareness and build a culture where water conservation is taken as a serious issue. Global campaigns like the world water day, among others, are celebrated every year with great fervor in all our campuses with active participation of our employees.

INNOVATIVE TECHNOLOGIES:

We strive to recycle and reuse every possible drop of water. Thus, we are constantly pushing boundaries for resource optimization and trying out innovative technologies. We are experimenting with new and more efficient ways of water treatment. Our aim is to encourage promising innovative treatment technologies for large-scale adoption.

1. Zero Liquid Discharge Policy through Sewage Treatment Plants (STP)

Our zero liquid discharge policy helps us achieve water efficiency through recycling and reusing 100 per cent wastewater in our sewage treatment plants (STP) across campuses, based on membrane bioreactor (MBR) technology. Currently, all the wastewater generated is treated and reused within the campuses for flushing, landscaping and in cooling towers. By adopting the MBR technology, the performance of the STP has improved considerably. We

| Description | Infosys Design Standards | NBC Standards/equivalent | Saving |
|---|--------------------------|--------------------------|--------|
| Software Development Blocks-Office building | 25 liters/person | 45 liters/person | 45% |
| Food Courts | 40 liters/seat | 70 liters/seat | 43% |
| Employee Care Centers-Hotel | 90 liters/person | 135 liters/person | 33% |

| Description | Flow Rate at Infosys | Standard Flow Rate | Percentage reduction/Savings |
|--------------|--------------------------------------|-----------------------------------|------------------------------|
| Shower | 6 lit/min | 12 lit/min | 50% |
| Taps | 2 lit/min | 8 lit/min | 75% |
| Water closet | 3/6 lit/flush | 6/9 lit/flush (dual flush system) | 41% |
| Urinals | 0.5 lit/flush and water less urinals | 4 Lit/flush | 88% |

are able to maintain consistent quality of recycled water (by limiting the biological oxygen demand-BOD- to less than 5 mg/liter)

2. Anaerobic MBR for Waste Water Treatment

To make our treatment methodology efficient, we piloted the anaerobic MBR wastewater treatment technology and found that it requires 30 per cent lesser energy, generates about 60 per cent lesser sludge, and utilizes less space compared to the aerobic MBR technology. We are currently planning to implement this technology in one of the sewage treatment plants in our campus.

3. Capacitive De-ionization (CDI) Water Treatment

We have piloted the Capacitive De-ionization (CDI) technology for treating water for potable purpose. This technology is an energy efficient water treatment system with water recovery capacity as high as 85 per cent, using 60 per cent lower energy than the current Reverse Osmosis (RO) system. The reject from the CDI system is about 10 to 15 per cent compared to 40 to 60 per cent in case of RO systems. We are planning to replace our RO systems with the CDI system to ensure high quality water treatment and optimum energy use. CDI system can prove to be a promising technology and can be easily replicated in large-scale.

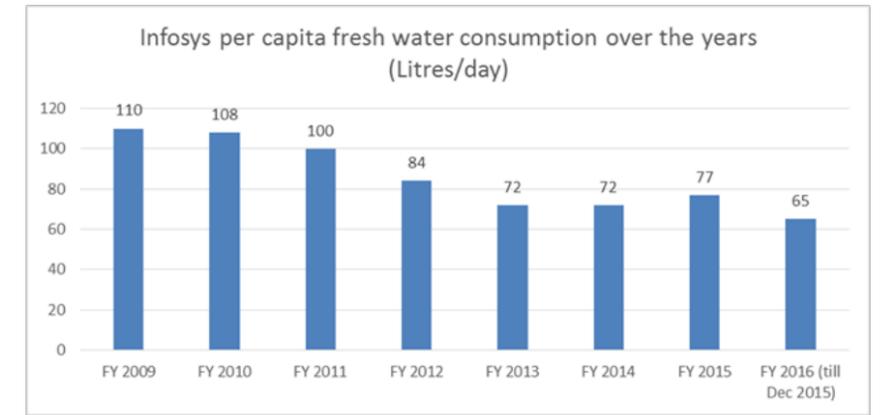


Fig 4: Year-on-Year Reduction of Per Capita Water Consumption Across Infosys

4. Smart Irrigation

We are working on Smart Irrigation systems to optimize our landscape water consumption. We are piloting this system in our Mysore campus. Once we fine tune the system to work efficiently, we will scale it up to all our campuses. This will reduce our recycled water consumption which can be used for other purposes including, flushing and cooling.

Innovative Design:

We follow RBD concept while designing our new buildings. RBD – Reduce By Design ensures we optimize our plumbing system by design so that we can reduce our water consumption during design itself. Above is the standards followed at Infosys as

compared to NBC standards.

Accountability:

We have installed smart water meters in 50% of our campuses to enable online monitoring of water consumption, and identify leakages, wastages and opportunities for reduction. These are full bore electromagnetic meters which ensure accurate measuring of water flow. These meters have the ability to communicate with the Building Management System (BMS), which helps us monitor water consumption in real-time.

We are in the process of installing smart water meters in all other campuses of Infosys across India to optimize the use of water to the maximum levels. We have set up a central command centre which connects all our building management

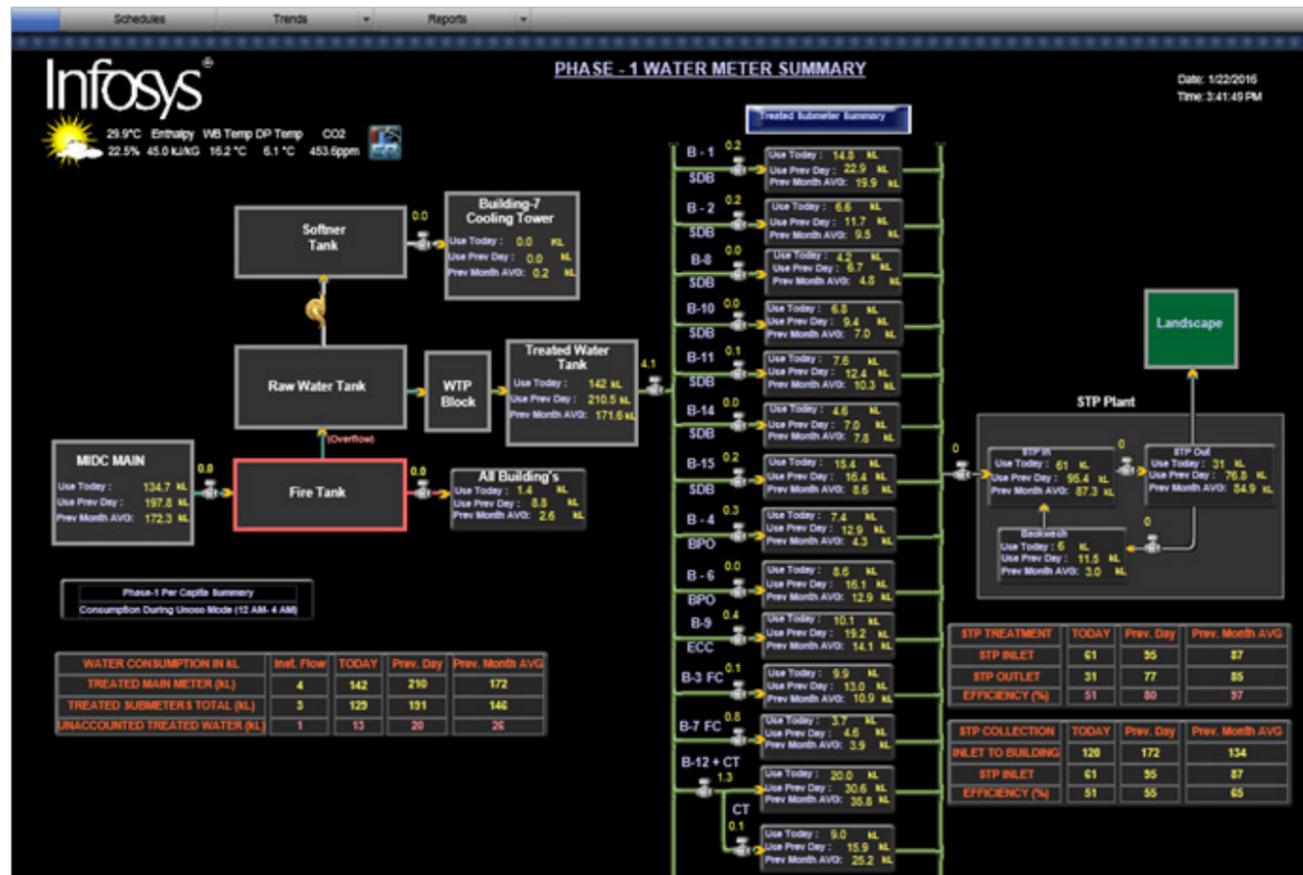


Fig 3: Water Balance on Infosys Central Command Centre Screen

| Water dashboard | | | | | |
|-----------------------|-------------------------|-----------------|-------------------|----------------------|------------------------|
| FY | Per capita (Liters/day) | Inc/(Dec) - YOY | Inc/(Dec) % - YOY | Cumulative Inc/(Dec) | Cumulative % Inc/(Dec) |
| 2007-08 | 109 | Baseline | | | |
| 2008-09 | 110 | 0.67 | 0.61% | 1 | 0.61% |
| 2009-10 | 108 | (2.33) | -2.12% | (2) | -1.52% |
| 2010-11 | 100 | (7.33) | -6.81% | (9) | -8.23% |
| 2011-12 | 84 | (16.00) | -15.95% | (25) | -22.87% |
| 2012-13 | 72 | (12.00) | -14.23% | (37) | -33.84% |
| 2013-14 | 72 | (0.80) | -1.11% | (38) | -34.57% |
| 2014-15 | 77 | 5.85 | 8.18% | (32) | -29.22% |
| 2015-16 (Till Dec'15) | 65 | (12.18) | -15.74% | (44) | -40.36% |

systems across India campuses from one single location. The Command centre facilitates continuous monitoring of data in real- time, eliminating wastage and optimizing water use to a large extent. The amount of water wastage stopped by the smart meters is significant and in the long run it is likely to have a big impact on water consumption. We believe that smart metering and monitoring will play a crucial role in conserving large amounts of water, tackling the looming water crisis and achieving our water sustainability goals.

Achievements:

These initiatives have helped us achieve great results in water conservation. We have been able to reduce our per capita fresh water consumption by about 40% compared to FY 2008 (baseline)

In fiscal 2015, our per capita consumption has increased from 72 to 77. We have identified that this is mainly because of unidentified water leakages in our water pipelines.

This year, we have undertaken extensive pipeline replacement works to eliminate water wastage. This is already showing results. We have seen a reducing trend in our per capita consumption.

Through our water efficient measures, we have avoided the use of about 5.9

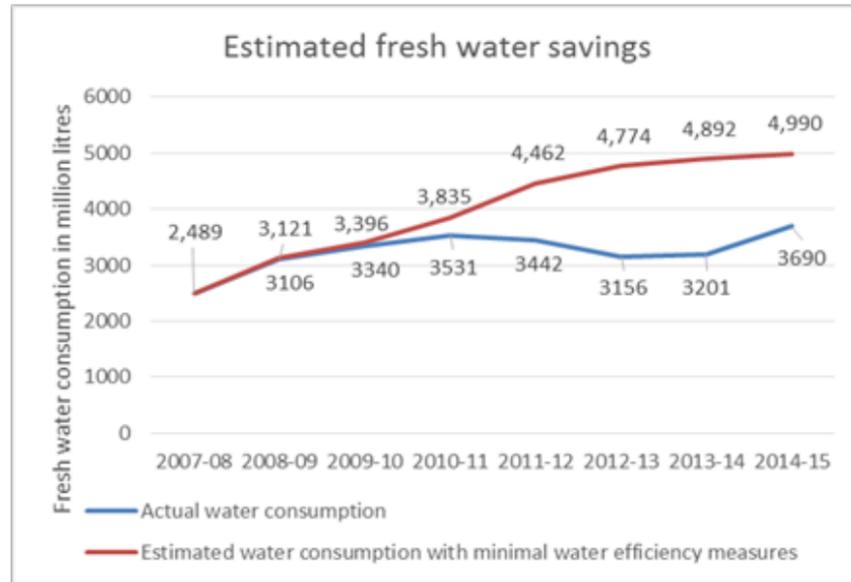


Fig 5: Estimated Water Consumption Avoided in the Last Seven Years

billion liters of water in the last seven years.

Additionally, we also ensured that the entire waste water generated in our campuses is recycled through onsite sewage treatment plants and reused within the campuses.

Path Forward:

We want to measure, monitor, manage and reduce wastages real time. We want

every drop of water to be measured so that we can optimize our water consumption. Below are some of the initiatives which are in the pipeline at Infosys.

- 1.Reduce per capita consumption by 50% with 2008 as baseline
- 2.Online water balance of all campuses.
- 3.Online leakage detection system

Awards and Recognition:

| S. no. | Award/ Recognition | Year | Category | Description |
|--------|--|------|---|--|
| 1. | National Award for Excellence in Water Management | 2011 | Excellence in Water Management (Mysore campus) | Confederation of Indian Industry (CII) recognizes and awards "Excellence" in Water Management in Industries to facilitate sharing of information by excellent Water efficient companies. Infosys Mysore campus was awarded for outstanding performance in water management |
| 2. | World Water Summit | 2011 | Best in the industry in Water management (Mysore campus) | Infosys was named the Best in the industry in Water management at the World water Summit |
| 3. | Green Rating for Integrated Habitat Assessment (GRIHA) | 2011 | Exemplary Demonstration of Integrated Water Management (Hyderabad campus) | GRIHA promotes sustainable habitats and related issues. It was founded by TERI (The Energy and Resources Institute, New Delhi) with support from MNRE (Ministry of New and Renewable Energy, Government of India) along with experts in the sustainability of built environment from across the country |
| 4. | Federation of India Chambers of Commerce and Industry (FICCI) Water Awards | 2015 | Industrial Water Use Efficiency Category (Bangalore campus) | FICCI Water Mission promotes and provides thought leadership in the area of water efficiency. It aims to facilitate the sharing and dissemination of best practices across industry sectors in order to encourage corporate and industry players to imbibe a culture of water conservation within their organizations. |

to monitor pipeline leakages using pressure sensors

4.To achieve water leakages of less than 2% for all campuses

5.Maximize the rain water harvesting through roof tops / surface run offs and use it or recharge the ground using injection wells.

Conclusion:

It is very critical, specifically for urban India, to avoid wastage of water. Reducing water use is the first step towards water conservation. This can be done through simple methods of using water efficient fixtures- which are easy and quick to install cost effectively. It is vital to add value to water by metering and monitoring the consumption, and being aware of the wastage points for immediate rectification. We need systems to treat sewage water and reuse the recycled water for non- potable purposes, including gardening, cooling, flushing, etc. In our endeavor to become water sustainable, we have implemented many efficiency measures to optimize our water use to the highest possible levels. This has helped us to achieve new milestones in the area of water sustainability. We have achieved about 40% reduction in our per capita water consumption in the last seven years. This translates into an avoided use of about 5.9 billion liters of water use in seven years. This has only been possible by pushing the boundaries of innovation, taking calculative risks, and setting new benchmarks for the industry to move towards on a more sustainable path.

We have demonstrated that it is viable and possible. It is important for other organizations to adopt these measures to optimize their water use, and recycle & reuse maximum amount of water possible. For us, it's not just essential for Infosys to be sustainable; we want the entire industry to walk the path of a sustainable growth for the benefit of the society.



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