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Efficient Use of Water

RECYCLING AND REUSE OF WATER

- Mihir Mehta

Leonardo Da Vinci known as the Universal Man for the breadth of his interests in arts, science and technology, called himself "Omo Sanza Lettere" (A man without letters) for his lack of formal education and difficulty with writing. I don't promise to be a man of letters and more importantly not any better than Da Vinci. However, it is important in this age of Sustainability that we ponder on the threats of one of the most basic elements of Mother Earth i.e WATER. Here is some food for thought.

ABUNDANCE OR SCARCITY

Water is incredibly abundant, covering about 70% of the earth's surface; however, the amount of fresh water available to us is actually considerably less. 97.5% of the water on earth is actually salt water, leaving only 2.5% as fresh water. 70% of this freshwater is actually frozen in the icecaps of Antarctica and Greenland.

This leaves less than 1% of the water on earth easily accessible for use, which is continuously replenished via the water cycle. However, the world's ever-growing population and industrial growth are putting more and more strain on the freshwater supply. About 3.6 bn people have access to Smartphones however about 2.2 bn people still don't have access to fresh water. Growth in Industries will be hampered with regions, states, and governments facing this social challenge thereby making the job of industry harder.

So the big question is – How do we deal with this?

BREAK DOWN THE PROBLEM INTO SIMPLER PARTS

1. Acknowledge the problem

Most companies have started identifying this as a serious threat and have pledged significant improvements in their overall water management. The industry we serve like Pharma and Lifesciences often focus on the quality of the treated water more than the waste generated. This is due to regulatory

compliances and the commitment to make every drug safe and reliable. It is hence assumed that the efficiency of the plant could be compromised but not the end water quality. In spite of this, many companies have come forward to declare their Plans to be Net Water positive in near future. This is akin to the famous JFK Moon speech which eventually ignited a series of efforts toward a larger cause. Acknowledging the problem is the first positive step toward solving the problem.

2. Inadequate Data

What is not measured cannot be managed effectively. The need to record and review the water consumption data becomes the starting point. With the advent of new-age instrumentation coupled with IoT platforms, it is possible to capture water distribution and consumption data at very low costs. By capturing the water consumption data, reviewing and analysing it, many companies have successfully reduced net water consumption by about 10-15%.

3. Technology Access

Currently, there are numerous technological solutions to reduce water wastage, but they are often expensive or too complex for deployment. Various technologies like Solar Vapour Condensation, Fog Condensers, Desalination, etc. have become more accessible than before, however, to be able to use them at a smaller industrial scale is a challenge. Moreover, these are breakthrough technologies to make more fresh water available.

However, to be able to overcome the efficiency problem, better existing technologies like HERO (High-efficiency RO) membranes, Continuous Electro-de-

ionization, etc. can be deployed.

Technologies from many leading companies provide higher efficiency than the conventional low-cost membranes / technologies where one manages to save money but compromise sustainability at large.

The use of chemical-free technologies also helps to reduce the overall load on the effluent treatment plant (ETP) and associated wastage.

4. Reuse with long term view

The need to reduce – recycle – reuse becomes increasingly important for the process industry. The re-use of water in industries like pharma is met with caution from the regulatory agencies concerned with the quality and safety of drugs. This prompts new strategies that may reconcile the conflicting goals of wastewater re-use and avoidance of cross-contamination via reused water. In order to ensure effective treatment of effluents from Process plants, manufacturing plants must separately manage different types of waste water. A distinction between highly toxic and concentrated streams should be done and provide pre-treatment if necessary. Innovative Zero Liquid Discharge (ZLD) technologies make it possible to almost

completely eliminate wastewater discharges, maximizing water reuse in the industry. Despite the high potential for water saving, the application of ZLD on an industrial scale is currently limited due to the high costs, energy consumption, and the generation of solid hazardous waste.

5. Reverse the sequence

While a new plant is designed, most conventional buyers tend to decide on the Point of Entry Water plant (design, budget, etc) first.

A decision on the Point of the Exit water system is taken at a much later stage of the project. The challenge with this approach is multi-fold.

a. Possibly the Water plant is designed without the consideration of the re-usability of water for utilities or processes from the ETP/ ZLD. This may not only increase the water wastage due to overdesign but also increase the CAPEX of the plant.

b. The size of the ETP/ ZLD also bloats with these 10-15% extra estimates thereby increasing the cost.

c. Most projects have depleted budgets while they reach the stage of ETP/ZLD finalizations.

d. There have been cases where the plants have surplus recycled high-quality water without an understanding of its appropriate use and benefit.

Given the various challenges, it is important to reverse the order of design and budget finalization for ETP/ ZLD based on feed water & waste quantum.

This can be then used while designing the Point of the Entry water system. One instance is a smart Lifesciences company who for their green-field project have decided to freeze the technology & budget for ZLD before the Water treatment plant which in our view will be the way forward!

We at Praj Hipurity are constantly focusing on high-efficiency systems, and water conservation by re-use and recycling. Our first contribution is by using these measures in our own manufacturing facility around Mumbai where our net water consumption has reduced by 19% and 26% over the last 2 successive years.

As Da Vinci once said “It had long since come to my attention that people of accomplishment rarely sat back and let things happen to them”. Now is the time to decide and act across the industry spectrum.

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