



Zero Liquid Discharge: Options for Bangladesh Textile Industry

By Somnath Battacharjee & Ritu Bharadwaj

The textile sector is the backbone of Bangladesh's economy. However, the industry is faced with many challenges due to high resource (energy, water and chemical) footprint and its consequent environmental impact. Water usage by the textile industry in Bangladesh is estimated to be 1,500 million cubic meters, which is principally made of groundwater. Around 70% of this water consumption takes place in the wet processing of textiles, which involves washing, dyeing, and finishing of textiles. Besides high water footprint, the textile industry also faces the challenge of dealing with the problem of effluent discharge and the use of coagulants and chemicals for its treatment. Realising the scale of these issues and the urgent need for addressing them, Bangladesh Government has recently issued the Zero Liquid Discharge (ZLD) Regulation for the textile sector. This poses a huge challenge for the industry, particularly for the small and medium sized units. The key to its successful implementation would be

a cautious and practical approach and view this as an opportunity to deal with the pressing environmental challenges in a sustainable manner.

Technological options for ZLD in Bangladesh textile sector

Implementing the ZLD mandate in Bangladesh is thwart with many challenges like; 1. Technical feasibility of various options, 2. Financial viability, 3. Practical implementation issues like lack of space in existing units to install effluent treatment plants, 4. Disposal of solid waste/ sludge that would be generated as a result etc. The Tirupur textile cluster in India, where zero discharge regulation has been under implementation for some time, have dealt with similar issues and undergone technology improvisation to deal with them. Learning's from Tirupur experience could be relevant for Bangladesh as it embarks on a challenging road to implement ZLD. Some recommendations based on India's experience are highlighted in this section:

Dealing with Operation and Management issues

In Bangladesh, the textile industry has largely emerged in clusters, where availability of space for setting up individual ETPs is an issue. Similarly there are issues with regard to economic viability of setting up and operating ETPs in tier 2 & 3 textile unit. To deal with these issues, Common Effluent Treatment Plant (CETP) can be considered to cater to the needs of smaller textile units. Several units in a cluster can jointly install and operate the ETP and share the capital and operating cost. This will help in achieving economy of scale for the small scale factories. However a common problem with the running of CETP is collection of Operation and Maintenance charges from member units. Here textile Associations like BGMEA can have a role in enforcing discipline and providing support in working out a practical agreement that can be followed by the industry at large. Depending on the response of different stakeholders, the industry can also think of adopting



different models of public private partnerships for management of CETP. This could include Build Own Operate (BOO) or Build Own Operate and Transfer (BOOT) models, in which the industry/ government can share the investments in full or part for the CETP, including land and capital costs, while the operating partner can invest in full or part for the operation & maintenance costs, which are then be recovered through user charges.

Dealing with Technical issues

While the technology for ZLD treatment and wastewater recycling has more or less stabilized, there are still many issues with this technology and approach to management of wastes. The most important one being evaporation of RO rejects in thermal evaporators. In fact several ZLD CETPs have failed due the failure of these Evaporators. The major issues are: high costs involved in evaporation; technical limitations in evaporating mixed salts, which is typical for textile wastewaters due to problems in crystallization; corrosion and scaling of the evaporators resulting in reduced life and efficiency; and frequent interruptions and downtime affecting processing capacity. Besides these issues, another problem is with regard to contamination of mixed salt with other pollutants during the Evaporation process. These mixed salts are unfit for reuse in textile processing on account of a host of

reasons. They also create a serious storage and disposal issue because in many cases they cannot be disposed in landfills and require hazardous waste disposal facilities. Most CETPs particularly ZLD-CETPs can generate several hundred tons/ day of Hazardous solid waste, such as sludge and waste salt. Thus Bangladesh textile industry needs to shift from the approach of ZLD to Zero Waste Discharge. This can be adopted in two ways discussed as follows:

- i. 'Zero Waste Discharge' can be achieved by promoting ZLD technologies that does not result in waste salt and sludge that can cause disposal issues. This will involve technical interventions that can help in recovery and reuse of salts and chemicals from wastewater. This can have a number of benefit such as elimination of sludge generation, enhanced reuse of salt in the dyeing process, reduced demand for ground water supply, enhanced local ground water table, prevention of ground water contamination, improved local micro climate, and loss of ecology. This approach has been successfully tried out in Tirupur textile cluster in India, wherein Nano-Filtration (NF) assembly has been used for salt recovery from R.O. reject and the recovered salt is being reused for dyeing.
- ii. Another approach to achieving 'Zero Waste Discharge' could be

use of textile sludge in other industries. Textile sludge can be used in a number of productive ways, for substituting raw material and energy requirements, in other industries. Some Cement Plants in India have started using textile sludge in Kilns as alternative fuel. Aditya Birla Cement, Chittorgarh (Rajasthan, India) unit has been co-processing ETP sludge of about 1000 tonnes per month from textile mills located in Bhilwara Industrial Area. Bangladesh textile industry could tie up with local cement industry to promote the sludge as an alternate fuel in Cement manufacture. Another option for use of textile sludge in Bangladesh could be as raw material in brick manufacture. This will however require R&D in terms of waste characterisation of sludge to assess its suitability for making non-fired bricks.

Way Forward

This is a need for integration of environmental concerns in the development and growth of textile industry in Bangladesh. This can be made possible by implementation of zero discharge system, which not only takes care of the environmental pollution, but also increases the price competitiveness through effective utilization of natural resources and increases productivity. In this regard the best way for implementing zero discharge is waste minimization by recycle of water, reuse of salt/ chemicals in dyeing and making productive use of waste sludge. On one hand it can prevents pollution of the environment and, on the other, it promotes water conservation. Adoption of zero discharge will enable Bangladesh textile sector in getting access to wider international market, enhancing its export and increasing employment and growth opportunities. This would, however, require a practical and phased approach and concerted effort of the textile industry as well as the Government of Bangladesh in addressing the challenges in implementing ZLD in a holistic manner.

Somnath Battacharjee & Ritu Bharadwaj are Director, India Program, and Senior Program Manager, Institute for Industrial Productivity (IIP) respectively.