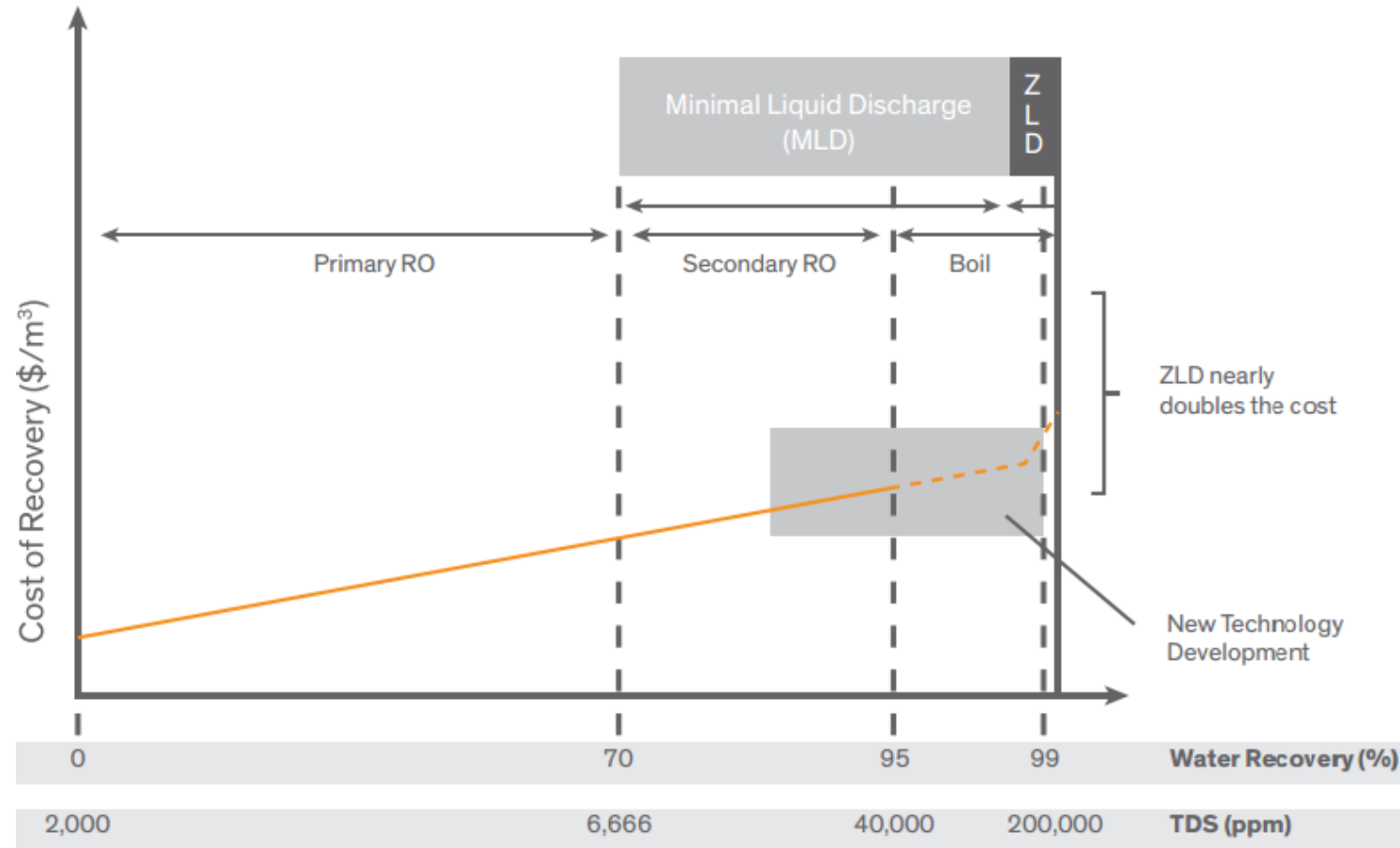


# Zero-to-minimal liquid discharge as waste water management approach

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# Why ZLD/MLD ?

- Process where all industrial waste water is reused after recycling without discharging a drop into natural water bodies.
- In India, as per CPCB notification (2015), guidelines for zero discharge for water-polluting industries were drafted <sup>1</sup>.
- New EPA guidelines expected in 2017 and 2022 with special emphasis on zero-discharge
- Global estimates<sup>2</sup> reveal that total market potential of ZLD may reach **210 billion by 2020**.
- It is thermodynamically impossible to attain zero discharges but shifting focus to **minimal liquid discharge** to achieve least EI.

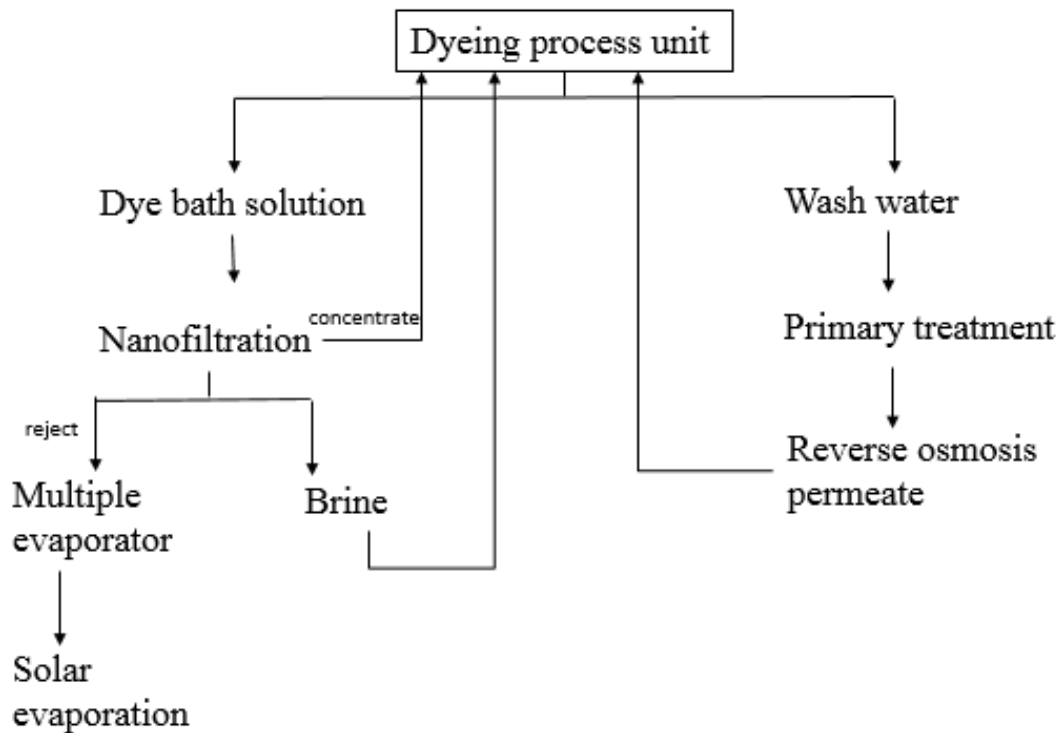


Source: Dow Water & Process Solutions has shifted its focus towards MLD <sup>3</sup>

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# Tirupur Textile Plant

- Based on the directions of the Madras High Court and TNPCB (2005), bleaching and dyeing units in Tirupur implemented CETPs to meet the Zero Liquid Discharge (ZLD)<sup>4</sup> norms.



Plant capacity: 5500 m<sup>3</sup>/d  
Water recovery >90-95%  
(including salt recovery)  
Processing cost/d = 70 lakhs

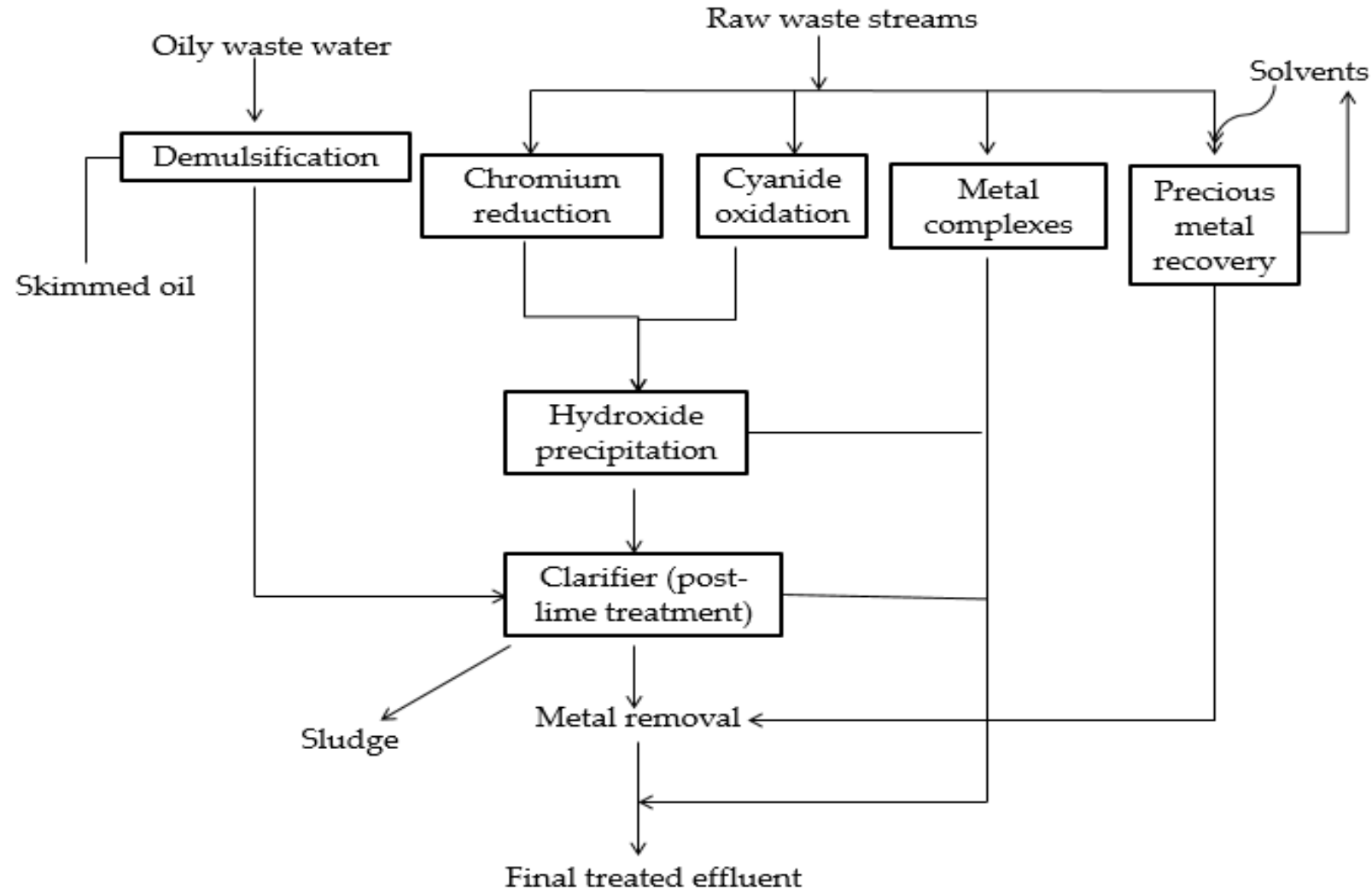
Fig 1: CETP Scheme at Tirupur textile plant

# Economics/ Postulated costs

CETP capacity	5500 m <sup>3</sup> /d
Cost of ZLD/MLD	≈ 2.75 lac
Water usage in dyeing	≈ 65 lit/kg fabric
Processing cost (including MVR/MEE)	≈ 70 lac
Hours of operation	6 – 12 hours (including reject handling)

- More than 450 dyeing units in Tirupur have set up 18 ZLD/MLD enabled CETPs with a total cost of Rs 1,013 crore.
- GOI has sanctioned 200 crores to the Tirupur Dyeing unit <sup>5</sup>

# Electroplating units/ Metal Finishing industries



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Fig 2: CETP Scheme at electroplating unit at Ludhiana <sup>6,7</sup>

# Economics/ Postulated costs

CETP capacity (Ni & Chrome units)	200 m <sup>3</sup> /d; but only 150 m <sup>3</sup> /d effluent is treated
Cost of Ni Recovery unit	3.5 lacs (to recover 30 Kg Nickel Sulphate)
O & M costs (projected)	Rs. 2,63,550 ( including acid treatments, lime treatment, electricity)
Water requirement for Chrome rinse stream	10000 litres per day
Capacity of Chrome recovery unit	To Recover 15 kg of Chromic acid per regeneration from rinse water (waste stream)
O & M costs (projected)	Rs. 3,66,960

## ► Textile Sector:

- Use of eco-friendly dyes and promoting eco-labels without compromise in pricing and outcome deliverables
- Chloride based evaporator design and suggesting products from mixed salts.

## ► Electroplating sector:

- Use of ion-exchange technique for final effluent from metal processing is found most efficient ( $> 97\%$ )
- Use trivalent chrome instead of hexavalent chrome.
- Use cyanide-free systems for zinc and copper plating
- Cadmium plating should be avoided.
- Minimal water use as rinsing systems or use of counter-current rinse systems



# References

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