Challenges of Sewage Treatment in India

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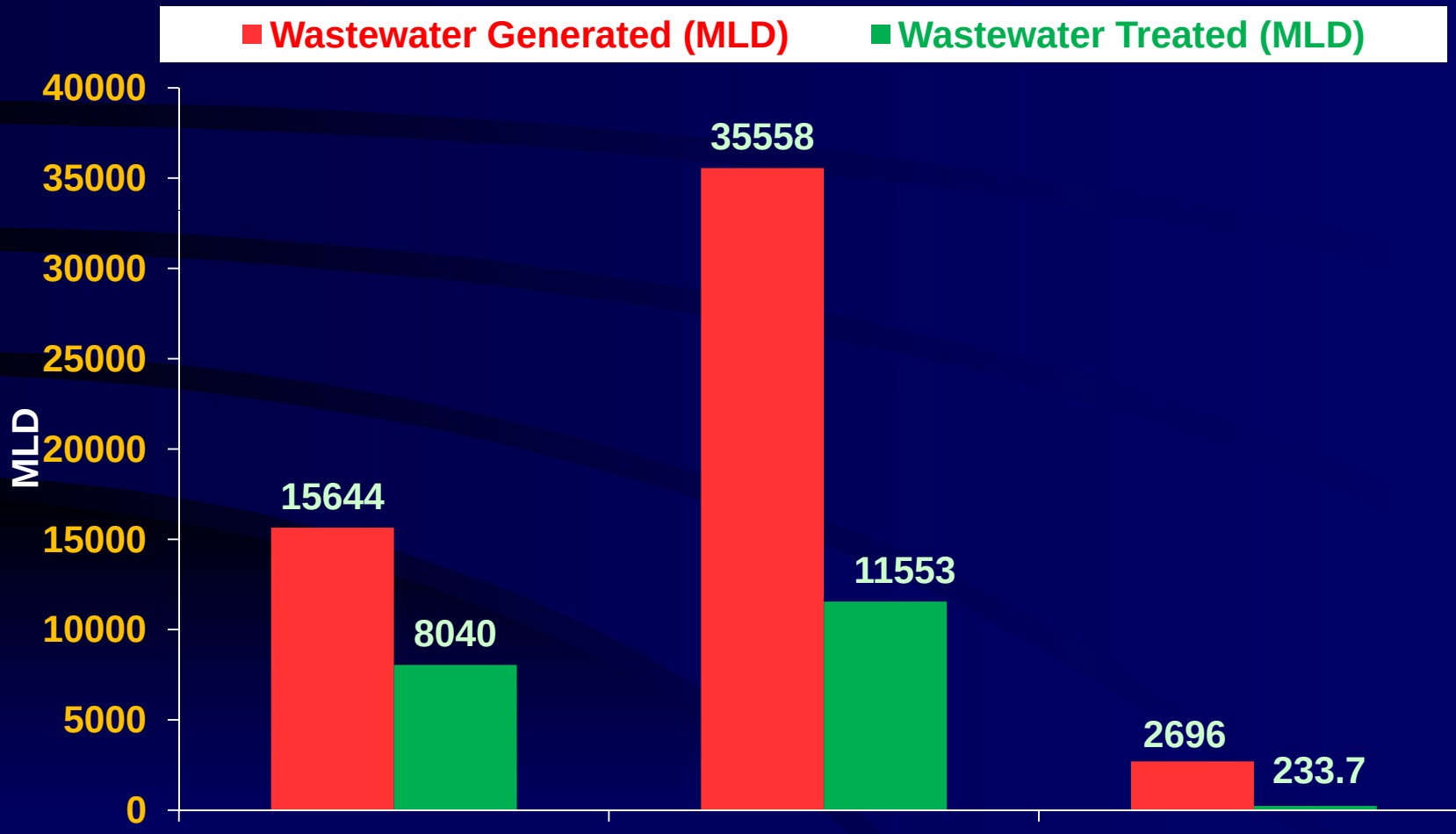
Water Scenario in Developing Countries

- Inadequate water supply and poor water quality
- Increasing demand for water for domestic, agriculture, as well as industrial purposes
- Available water resources continuously getting deteriorated

Causes

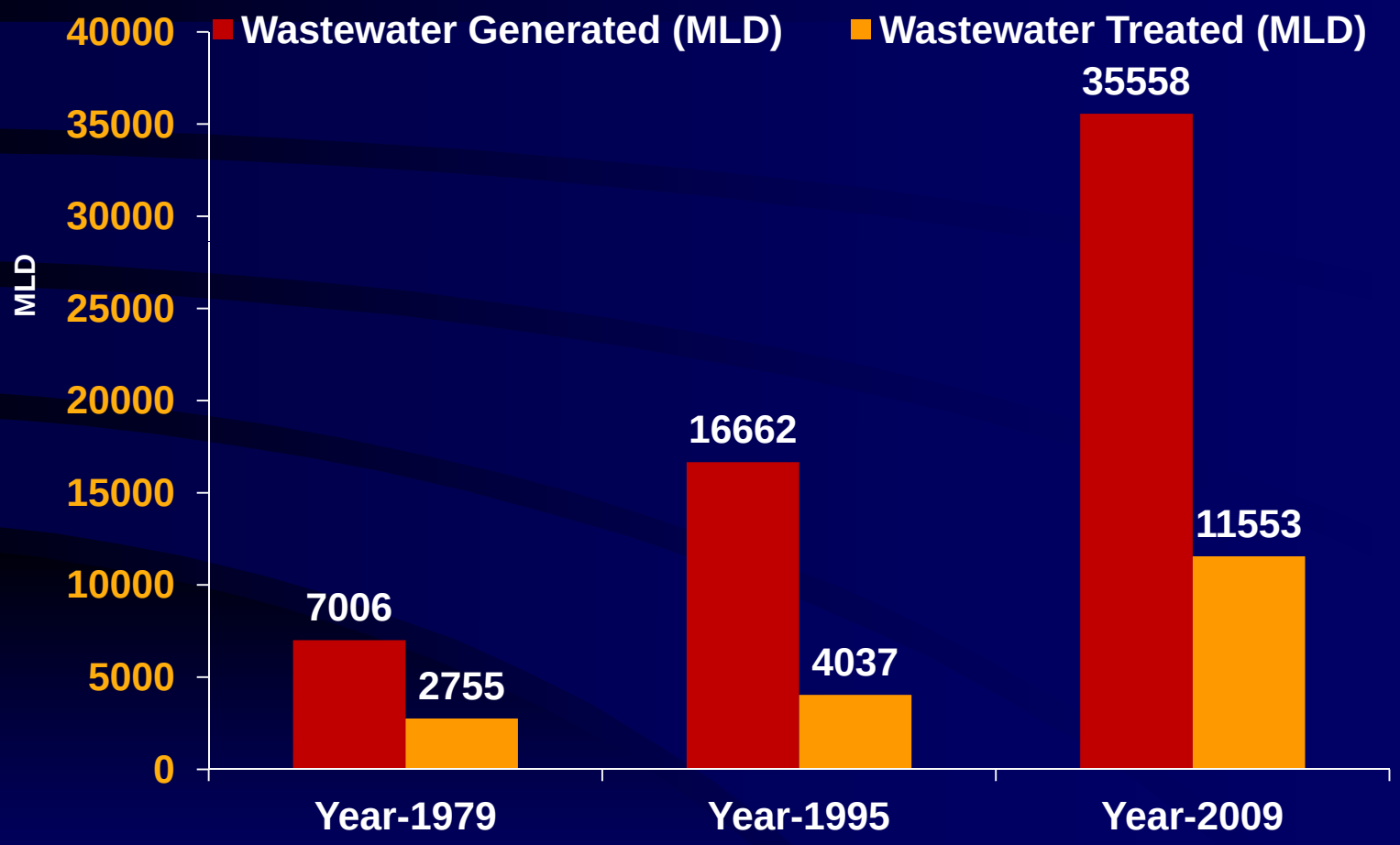
- Discharge of partially treated or untreated wastewater/ effluents into water reservoirs
- Agricultural and Urban runoff
- Increasing water demand
- Excessive water withdrawal prevents dilution of pollutants

Wastewater Treatment in India



[CPCB, 2009]

Trends of Wastewater Treatment and Management in India



(Source: CPCB, 2009)

The Imminent Challenges in Management of Water Resources

- Pollution due to disposal of untreated (or partially treated) sewage and sullage into natural watercourses and

- Pollution caused by disposal of industrial wastewater into sewers and watercourses

One usually encountered solution is to treat the sewages and wastewaters to regulatory standards and then dispose them off into receiving bodies!

The other less favored solution is to treat the sewages and wastewaters to much HIGH standards and then reuse / recycle them!

Reclamation of Wastewaters for Recycle and Reuse : A New Horizon

- **The treated effluent is used as a water resource for beneficial purposes**

  ------*New* and *assured* water source

- **The effluent is kept out of streams, lakes, and beaches;**

  ------ *Reduces* pollution of natural water reservoirs

Reclamation… *cont'd…*

Reuse:

To extend the life of resource/product by using it again, repairing it, modifying it or creating new uses for it

Recycle:

Collecting and reprocessing already manufactured materials for remanufacture either as the same thing or as part of a different product

Reduce:

To bring down use of resource/material to a smaller extent, size, amount or quantity

Solution – Water Recycling

Advantages:

- **Achieving 24 x 7 water supply**
  - **Reduced consumption of potable water**
  - **Elimination water pollution problems**

- **Reducing cost of wastewater treatment**

Points for Immediate Action

- The installation and operating costs of existing technologies are rather high and hence are ill-afforded by the communities
- The available technologies are often complex, require heavy machinery that are capital intensive as well as energy intensive during operation and
- The technologies usually rely upon expensive chemical inputs (such as chlorine, alum, lime, poly-electrolyte, etc.) and generate sludges that may be hazardous in nature and difficult to de-water and dispose

What is “Appropriate”?

- Low cost with Minimum possible Mechanization
- Simple in Operation
- Suitable for Incremental improvement and
- Recycle and Reuse oriented

Decentralized Solutions are Appropriate

- **Effective and low-cost**
- **NTSs Utilize plants and their associated rhizospheric microorganisms**
- **Natural synergistic relationship**
  - ***plants***
  - ***soil***
  - ***microorganisms and***
  - ***water***

Aquatic Natural Treatment Systems

The most common NTSs include

- Waste Stabilization Ponds (WSPs)
- Hyacinth and Duckweed Ponds (DPs)
- Fish Ponds
- Oxidation Ponds and Lagoons
- Algal-bacterial ponds
- Polishing Ponds (PPs) and
- Constructed Wetlands (CWs) *etc*

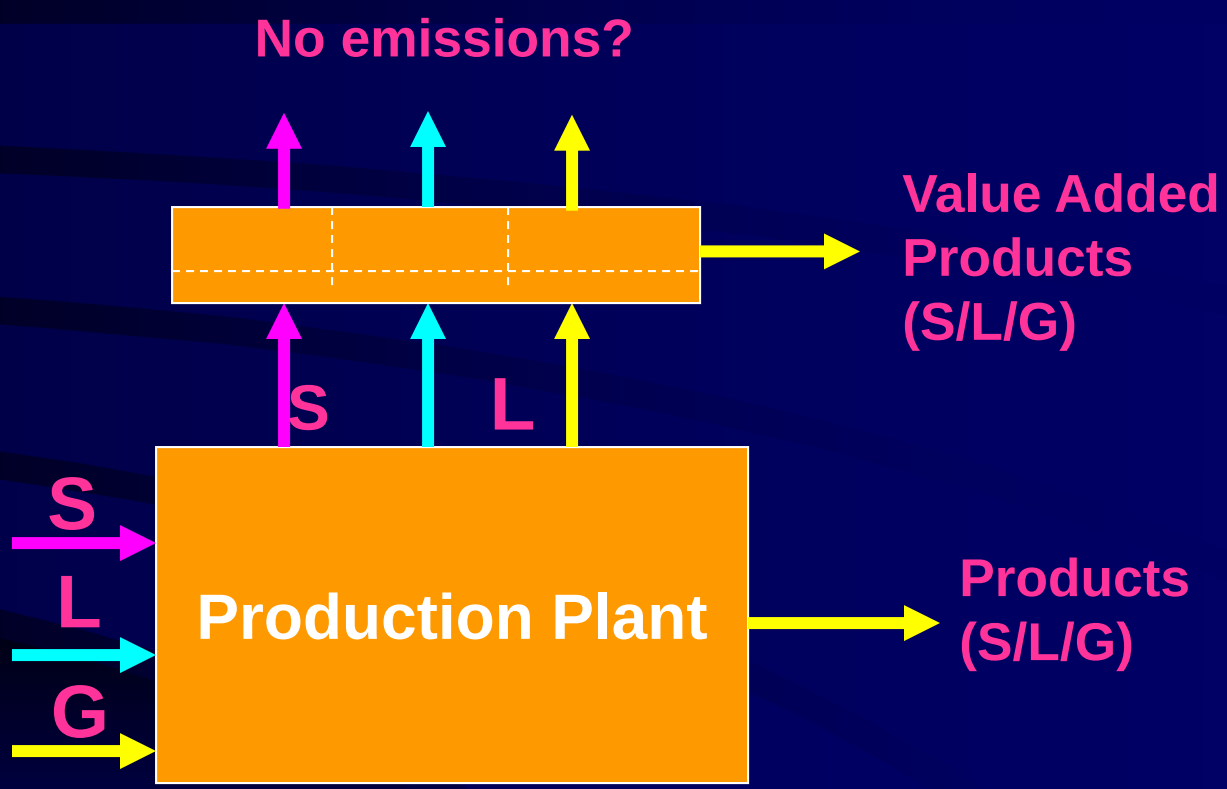
Zero Discharge?
Near-Zero Discharge?

- Zero discharge differs from pollution prevention from the perspective of converting all the waste into useful material
- Zero Discharge is the final destination of the journey towards preventing pollution
- In reality absolute zero discharge condition may not be always possible hence near zero discharge can be achieved

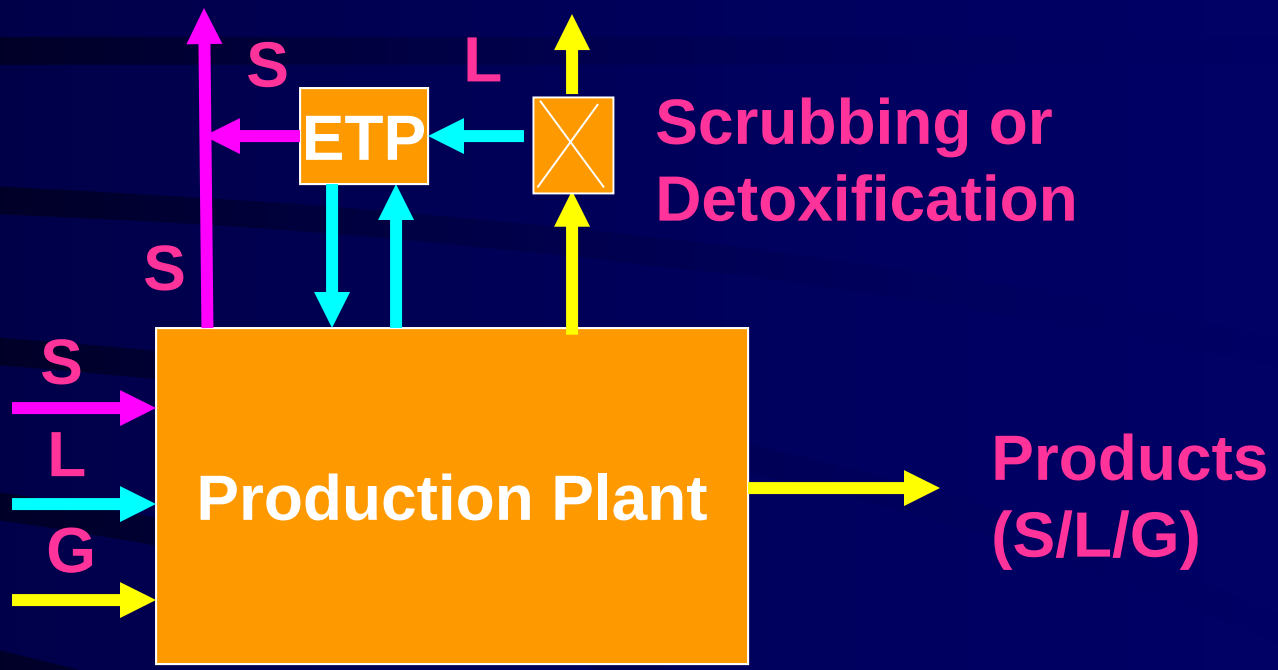
Zero Discharge… *cont'd…*

- In its broadest sense, "zero discharge" means no discharge/emissions to any media
- More commonly, zero discharge focuses on Zero Liquid Discharge (ZLD)

Theoretical Zero Discharge



Zero Liquid Discharge



Technological Options for Zero Liquid Discharge (ZLD)

- Water Conservation
- Wastewater Minimization
- Wastewater Recycle / Reuse
  - Reverse Osmosis
  - Thermal/Vacuum Evaporation
  - Electrodialysis
  - Ion Exchange

Is there a "Market" for Recycled Water?

There are two schools of thought:

I. No!
   Let us not leapfrog
   Let us be practical
   Let everybody at least achieve MINAS

II. Yes!

   Yes but at certain places!
   Easier near industries, Areas of scarcity

   Yes but after few years!
   Policies, Tariff, Incentives

Can we Create the "Market" for Recycled Water?

There are two schools of thought:

I. **No!**

People are not ready to use "sewage"
Treatment is expensive
There are no good examples
No gray water distribution network

II. **Yes!**

Make it mandatory for industries!
Easier near industries, Areas of scarcity

Make it mandatory for HRBs, CHSs, Malls, Commercial Bldgs, Govt. Bldgs!
Policies, Tariff, Incentives

Thank you!