



Zero Liquid Discharge Systems

TRANSPARENT ENERGY SYSTEMS PVT. LTD.

1st Floor Pushpa Heights Pune-Satara Road Pune 411037 India

Phone: 0091-20-24211347

Fax: 0091-20-24212533

Email: projectsales@tespl.com

Web: www.tespl.com

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Why Recycle Water?

- To cater to increased water demand due to
 - Urbanization, industrialization
 - Reduced rainfalls and depletion of natural resources
- Prevention of water pollution
- Social obligation
 - Disposal of waste water spoil natural water bodies and offer health hazards
- It saves
 - Fresh water consumption
 - Water Treatment costs
 - Boiler and Cooling Tower blow-down losses
 - Loss of production & revenue due to forced closures by pollution control board
- Reduces public liability costs
- Promotes public goodwill, brand image & recognition in society
- Employee Motivation
- Business growth
- Improves productivity

Limitations of Conventional Water Recycling Plants

- Inferior, unproven, unreliable technologies
- Poor revenue to capital ratios
- Weaknesses in economic viability
- Energy Intensive
- High running cost

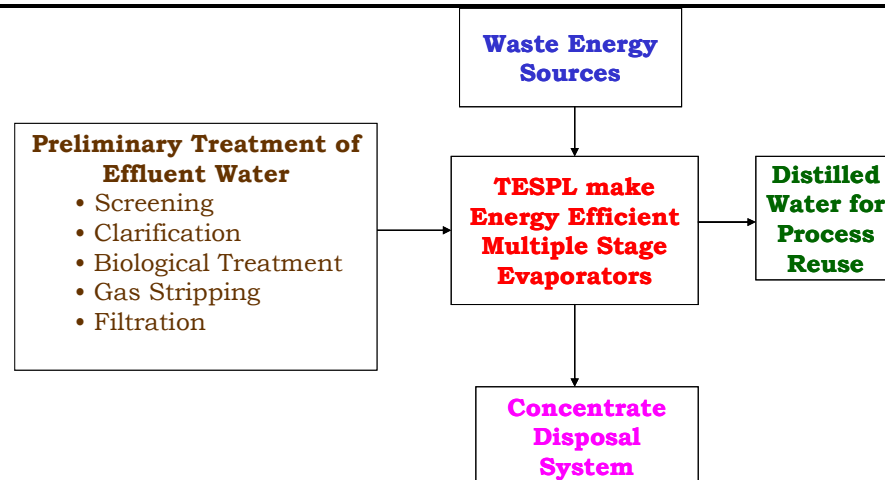
Innovative Features of TESPL ZLD System

- Process Integrated Energy and Water Conservation Systems
- Sustainable Utilization of Process Waste Heat for Zero Liquid Discharge (ZLDS)
- In-house expertise on design of Thermocompressor and its application
- Self Paying Systems
- Low Operational Cost
- Highly customized and tailor made systems
- Easy to Retrofit
- Tailor Made Systems
- Reliable and efficient evaporation systems

Why Tailor Made Projects ?

- Waste water characteristics vary widely from industry to industry.
- In every case pilot tests have to be carried out to establish properties of Wastewater.
- Suitability and type of treatment technology.
- The variations in composition of wastewater makes every plant to be tailor made.

Typical Scheme of ZLDS



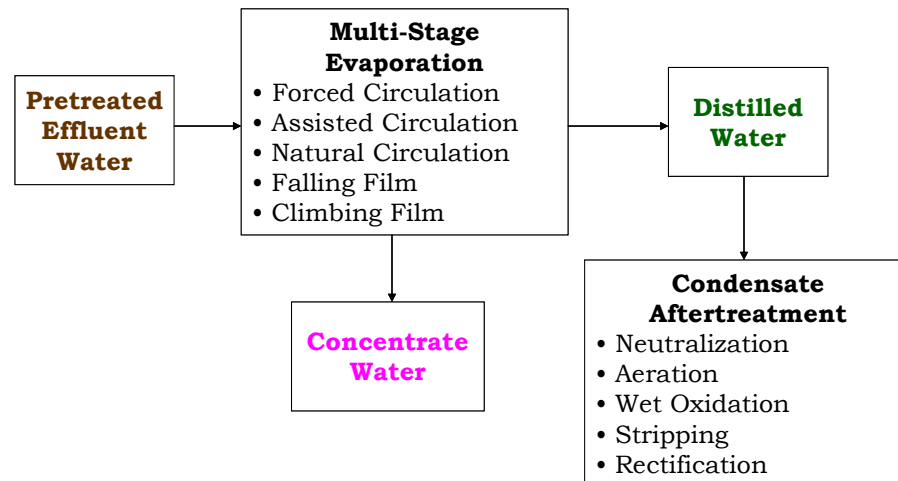
Waste Energy Sources Used for Water Recycling

- Incinerator / Furnace Exhaust
- Steam Turbine Exhaust Heat
- Engine Jacket Water
- Engine / Gas Turbine Exhaust Gases
- Process Hot Water
- Process Hot Gases

Innovative Features of TESPL Make of Multistage Evaporators

- Superefficient, specially engineered proprietary design of Thermal Vapor Recompressor
- Use of reliable mechanical recompressor whenever economical over steam Thermocompressor.
- Conservative thermal and hydraulic design
- Extremely efficient vapor liquid separator
- Handles fouling media and Heat Sensitive Materials effectively
- Optimum Number of evaporator stages
- Fully Automatic with Data Logging Facility

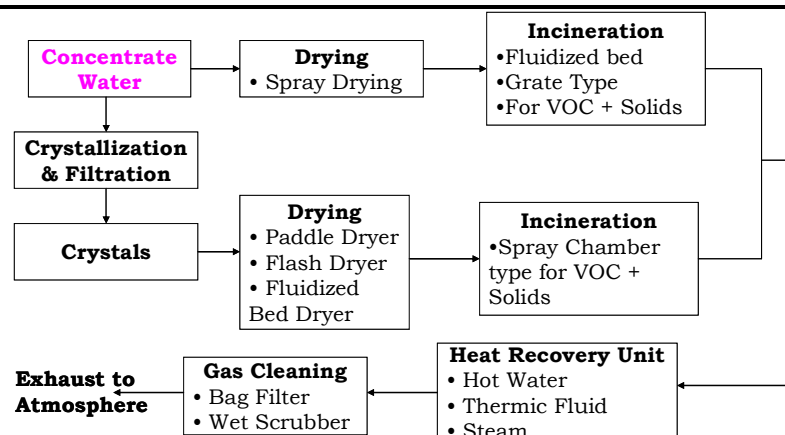
Multi Stage Evaporators



Innovative Features of TESPL Make of Concentrate Disposal System

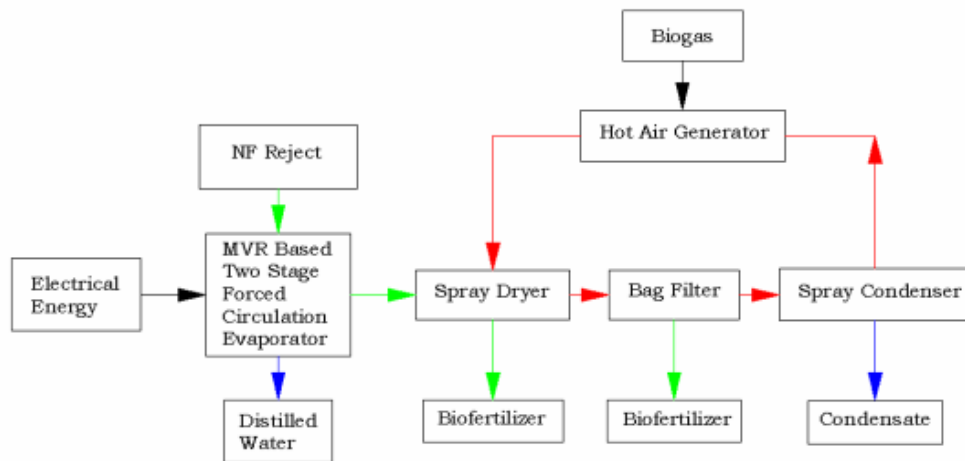
- Only solids for Landfill
- Complete Odor Destruction System
- Utilization of Waste Energy
- Customized Design
- Low cost of Landfill Operation

Concentrate Disposal System



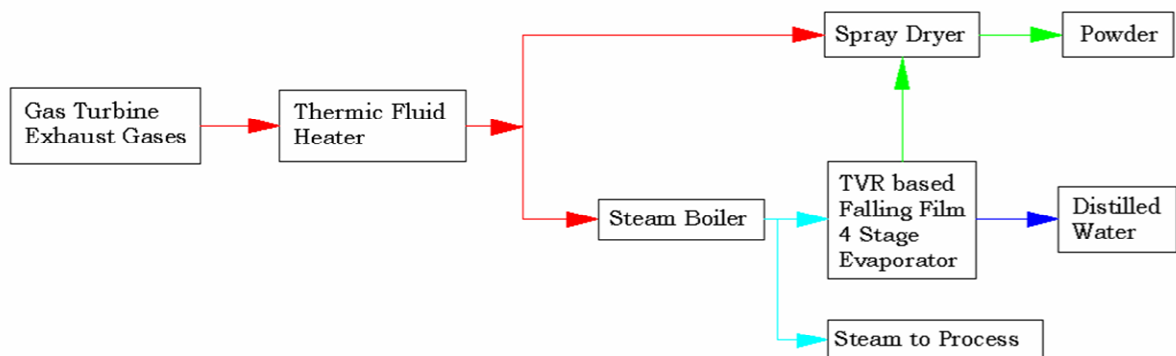
Case Study 1

Capacity: 5000 kg/hr
 Reusable Water: 4125 kg/hr
 Source of Energy: Biogas, Electricity



Case Study 2

	Unit 1	Unit 2
Capacity	7500 kg/hr	6000 kg/hr
Reusable Water	7260 kg/hr	5808 kg/hr
Source of Energy	Gas Turbine Exhaust Gases	Gas Turbine Exhaust Gases



Industry Applications

Evaporators -

- Caustic recovery in textile mills
- Sugar juice concentration,
- Distillery Effluent Evaporators
- Chemical process evaporators

Zero Liquid Discharge Systems -

- Pharmaceuticals Industry
- Polymer Industry
- Automobile Industry
- Distilleries & Breweries.
- Pesticides & Insecticides.
- Dyestuff Industry.
- Textile & Dyeing Plants.
- Paper & Pulp Industry.
- Food Processing Industry.
- Meat Processing Plants.
- Fisheries & Fish Processing Units.
- Beverage Bottling Plants.
- Dairy Industry.
- Chemical Industries.
- Paints & Pigments Industry.
- Agrochemicals & Fertilizer Plants.
- Solvent Extraction and Edible Oil Refining Industry.
- Ink & Varnish Industry.
- Hotels, Laundries and Hospitals.
- Sugar Industry
- Any other Industry generating wastewater.

Note on Transparent Group of Companies



Transparent Energy Systems Pvt. Ltd

Business group	Product	Website
Heat Recovery Systems	Waste Heat Recovery Boilers & Systems	www.heatrecovery-system.com
Ammonia Absorption Refrigeration (know-how from Mattes Engineering Germany)	Refrigeration upto -55°C	www.tesplarp.com
Cogeneration systems & Rankine Cycle Power Plants	Power, Heating & Chilling water recycling Electrical Power output upto 175MW	www.tespl.com www.lamont-services.com
Large Capacity High Pressure Steam Boilers, heaters with Technical Know-how from world famous Lamont Kessel GmbH & CO. KG, Germany	Pressure up to 200 bar Steam output capacities 320T/hr Hot water boilers 1 MW to 175 MW	www.tesplcogen.com www.tespl.com www.lamont-services.com
Biomass Gasification Plants Biofuels & Biodiesel Plants with Technical Knowhow M/s. Bioenergie Beratung Bornim, GmbH, Germany	Wet and Dry fermentation of biomasses like liquid biofuels, solid, biodiesel production, bioethanol production Bio diesel plants working on used / unused oils and fats. Biofuel manufacturing plants on fruit wastes, vegetable waste cellulosic materials etc.	www.tespl.com www.b3-bornim.de
Boilers and Heaters	95% super efficient Oil/ Gas fuelled Boilers, 89% super efficient Agrofuelled/ Coal Fired Boilers, 93% super efficient Thermic Fluid Heater/ Hot Air Generators	www.tespl.com
LiBr Chillers	Wide range of heat inputs viz - Low & Medium Pressure Steam / Superheated Hot water. Special proven design to utilize heat from low temperature hot water of 55°C or higher	www.shuangliang.com
Evaporators and Water Recycling	Multistage evaporators/ Desalination	www.waterrecyclingplant.com
Energy & Water Consultancy	Energy/ Water conservation	www.tespl.com



Transparent Technologies Pvt. Ltd.

Business group	Product	Website
Dryers	Spray/ Dryer Flash/ Fluid Bed Dryers / Flash Dryers/ Conveyor Dryers	www.ttplpune.com
Coolers	Spray Coolers (Closed / Open Circuit) / Fluidized Bed Coolers / Bulk Flow Coolers	www.ttplpune.com
Granulators	Spray Granulators / Fluidized Bed Granulators / Rotary Granulators	www.ttplpune.com
Waste to Energy Incinerators	Fully Automatic, Mechanized Fluidized Bed, Liquid/ Solid Gas Incinerators Paint Stripping Systems, Thermal Sand Reclamation Systems Solvent Recovery	www.ttplpune.com
Evaporators & Concentrators	Multiple Effect / Falling Film / Counter Flow / Spiral Tube / Plate / Agitated / Rising Film / Natural Circulation Evaporators	www.ttplpune.com



EcoKleen Pollution Control Pvt. Ltd.

Business Group	Product	Website
Pollution Control	Scrubbers / Bag Filters / Cyclones / Multiclones	www.ecokleen.com
Flue Gas Desulphurization Plants	Wet Wet / Wet Dry / Dry Dry Systems	www.ecokleen.com
Fume & Dust Extraction Plants	Top Entry & Slide Entry Hood Extraction	www.ecokleen.com
Air Stripping Plants & Airborne Solvent Vapor Recovery Plants	Activated carbon based plants & Organic Liquid Absorption Based Air Stripping Plants	www.ecokleen.com
Thermal Oxidation System of Airborne Solvent Vapors	Catalytic Based & Non catalytic Based	www.ecokleen.com
Bulk Material Handling	Screw Conveyors & Feeders/ Rotary Valves / Air Locks / Pneumatic Conveying and Powder Handling Systems	www.ecokleen.com



Decimin Control Systems Pvt. Ltd.

Business Group	Product	Website
Noise Abatement Products & Systems	Acoustic Canopies for DG Sets, Compressors, Machinery Noise Silencers for Engines, Blowers, Compressors, Valve Exhaust, Acoustic Louvers & Baffles Gas Turbine Inlet/ Outlet Systems ISO Containerized DD sets/ Compressors Engine House Acoustics	www.decimin.com



Ecosustain Energy Systems Pvt. Ltd.

Business Group	Product	Website
Steam Turbine Generators	Stage Extraction / Condensing / Back Pressure Multi-Stage / Single – Stage Superheated / Saturated Steam Inlet	www.ecosustainenergy.com
Steam Turbine Drives For Pumps / Blowers / Compressors		
Steam Condensers	Water Cooled Shell & tube Air Cooled Finned Tube	



Ecosustain Technologies Pvt. Ltd.

Business Group	Product	Website
Water Recovery and reuse from effluents Turnkey solutions through CE-CIC	Conceptualization, Engineering, Coordination, Inspection, Commissioning	www.ecosustain.co.in
Vital Technologies used	Ultra filtration, Reverse osmosis (RO) . Super efficient multistage evaporators and crystallisers Ultra-violet based wet oxidation systems High pressure thermal wet air oxidation systems Absorption and ion exchange Drying and incineration Waste heat utilization	www.ecosustain.co.in

Business Alliances

- **Mattes Engineering GmbH, Berlin Germany** (www.mattes-int.com) World leaders in Ammonia Absorption Refrigeration Plants. Technical collaboration and Knowhow transfer agreement with Transparent Energy Systems Pvt. Ltd.
- **LaMont-Kessel GmbH & Co. KG, Germany** (www.lamont-services.com) World famous technology providers for wide range of power boilers / heaters and complete power plants. Technology Licensing and Knowhow Agreement with Transparent Energy Systems Pvt. Ltd. for design, manufacture, sell and erect La Mont-steam-boilers, thermal oil heaters, hot water boilers.
- **BioenergieBeratungBornim GmbH - B3 - Germany** (www.b3-bornim.de) Bornim (B3) has several years of international standing in the field of biomass Gasification Products and Systems Technology Licensing and Knowhow Agreement with Transparent Energy Systems Pvt. Ltd. for Wet & Dry Fermentation of solid, semi solid & liquid Biomasses, Bio-diesel and ethanol production technologies etc.
- **Jiangsu Shuangliang Air-conditioning Equipment Co. Ltd., China** (www.shuangliang.com) World famous manufacturers of wide range of LiBr based absorption chillers, Co-operation agreement with Transparent Energy Systems Pvt. Ltd. for application engineering, sales and service.
- **Shandong Qingneng Power Co., Ltd., China.** (www.qnrd.com) Well established Manufacturers of wide range of steam turbines, Co-Operation agreement with Ecosustain Energy Systems Pvt. Ltd. for application engineering, sales and service.