



COST EFFECTIVE

**ZERO LIQUID DISCHARGE
(ZLD)**

**FOR
INDUSTRIAL WASTE
WATER....**

Presented by Team ROCHEM

We have partnered with Industry for last two decades

To Make

**Wastewater Recycling/Reuse and Zero Liquid
Discharge Solutions**

Possible.....

Feasible.....

&

Now Sustainable...



About Us

- Rochem Separation Systems (India) Pvt Ltd founded in 1991.
- Technical Collaboration with Pall Rochem Wassertechnik GmbH (Hamburg, Germany) made it possible to offer the following systems:
 - Reverse Osmosis
 - Nano Filtration
 - Ultra Filtration
- Since inception, leaders in Waste water re-cycling & Sea Water Desalination having sold thousands of Plants of various capacities, installed pan industry & on ships/submarines of the Indian Navy, Indian Coast Guard and the Shipping Corporation of India and the Merchant ships.



Our Business

- An ISO 9001:2008 certified organization with Advanced Membrane Module Technology Based Separation Systems for recovery and re-use of difficult waste water
- Supplies high end waste water treatment plants, operational and technical services through Operations and Maintenance Contract and Annual Maintenance Contract thereby helping industries achieve Zero Discharge with its RO/Nano/Ultra Filtration applications.

Industries we cater to



Chemical



Distillery



Starch



Cement



Tanneries



Marine



Steel



Food & Beverages



Pharmaceutical



Textile



Paint & Pigments



Automobile

Our Mission

**CHANGING THE FACE OF WATER
& WASTE WATER TREATMENT !**



Our Presence in India

Over **1500** industrial installations on **various** applications of **ALL industrial** segments

Over **200** installations on Ground/Brackish water applications & over **250** installations on offshore SWRO

> **300 plants** under comprehensive **O&M**

> **500 strong service team** ensuring O&M/service support

Market leader in delivering end to end solutions for **Recycle & ZLD**

25 years of experience in waste water/effluent recycling



Our Solutions



Sea Water Desalination

Brackish water desalination + City/bore well water purification

Industrial Waste Water Recycle – Reusable water from Wastewater

Sewage Recycle – Industrial grade reuse water from Sewage

Landfill leachate treatment

Ultra filtration- Biological Membrane Bioreactors

Radioactive Waste – Concentration of Active waste water

Dye concentration, Sugar Juice Clarification & Concentration

Ultrapure water

Effluent Treatment Plants / Biodigester

Total Zero Liquid Discharge Solutions on EPC basis

Waste Heat Evaporators

What is an effective ZLD....

Maximum **Resource Conservation** - Water Re-cycle/Re-use

Minimize effluent volumes at **lowest energy input** cost

Economically achieve highest possible concentration of waste water

Target **Lowest operating cost** option for total ZLD scheme

Integrate existing capital equipment to **minimize investments**

Lowest net energy balance



Typical waste waters found

Low TDS

- Lean waters with lower TDS, BOD/COD

**Medium
TDS**

- Widely found in industries

High TDS

- Mixed industries + RO rejects

How has ROCHEM responded

Product development

- High Pressure RO + ERD
- DAF + Waste Heat Evaporator(WHE)

New additions

- Low Pressure ROs
- Hybrid ROs – STPT

Effective commercials

- ROSERVE – Pay per use
- Sale

Low Investments

- Steam Integration with existing MEE

**Lower
Energy foot print**

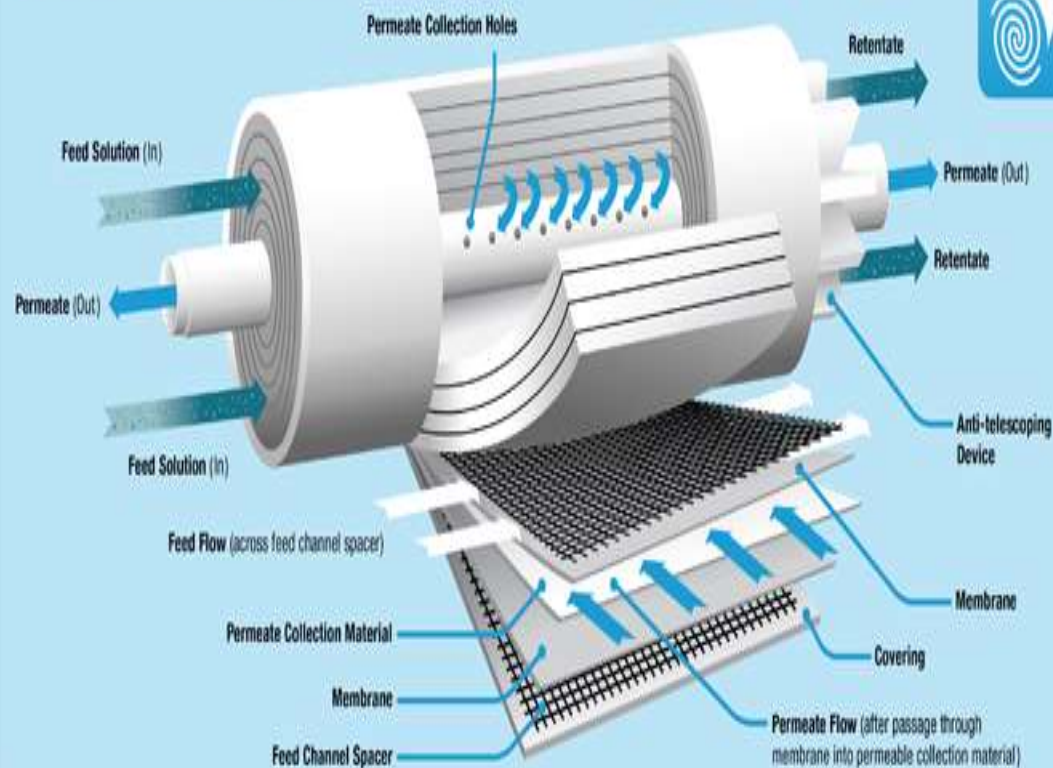
- Solar based integration for WHE



SALIENT FEATURES OF PTR0 & WHE (ZLD)

The Difference.....

Spiral Membrane Configuration



Advantages – PTRO

- Open Channel Feed Flow Path
- Short Flow Path
- Low Membrane replacement cost
- Minimum Area Of No Flow
- No / Low Chemical Pretreatment
- Ease of access to membranes



What is there for customer?

- No conventional pretreatment required.
- Higher & Consistent recovery.
- High COD/BOD handling.
- Easily upgradeable.
- Reusable water quality.

HP-RO



**High Pressure – 75, 90, 120 & 225 Bar
RO Systems**

*Advantages of **PT(HP)-RO** systems*



Rochem **PT(HP)-RO** system can be applied on existing RO rejects thereby further reducing the final volume of effluent to be treated for disposal.

Reduction in steam consumption

Lower treatment cost due to absence of need for operating fuel and lower power costs

Smaller + Modular foot print, ease in handling.

No thermal stress, no frequent mechanical & process failures.

Energy Recovery Device

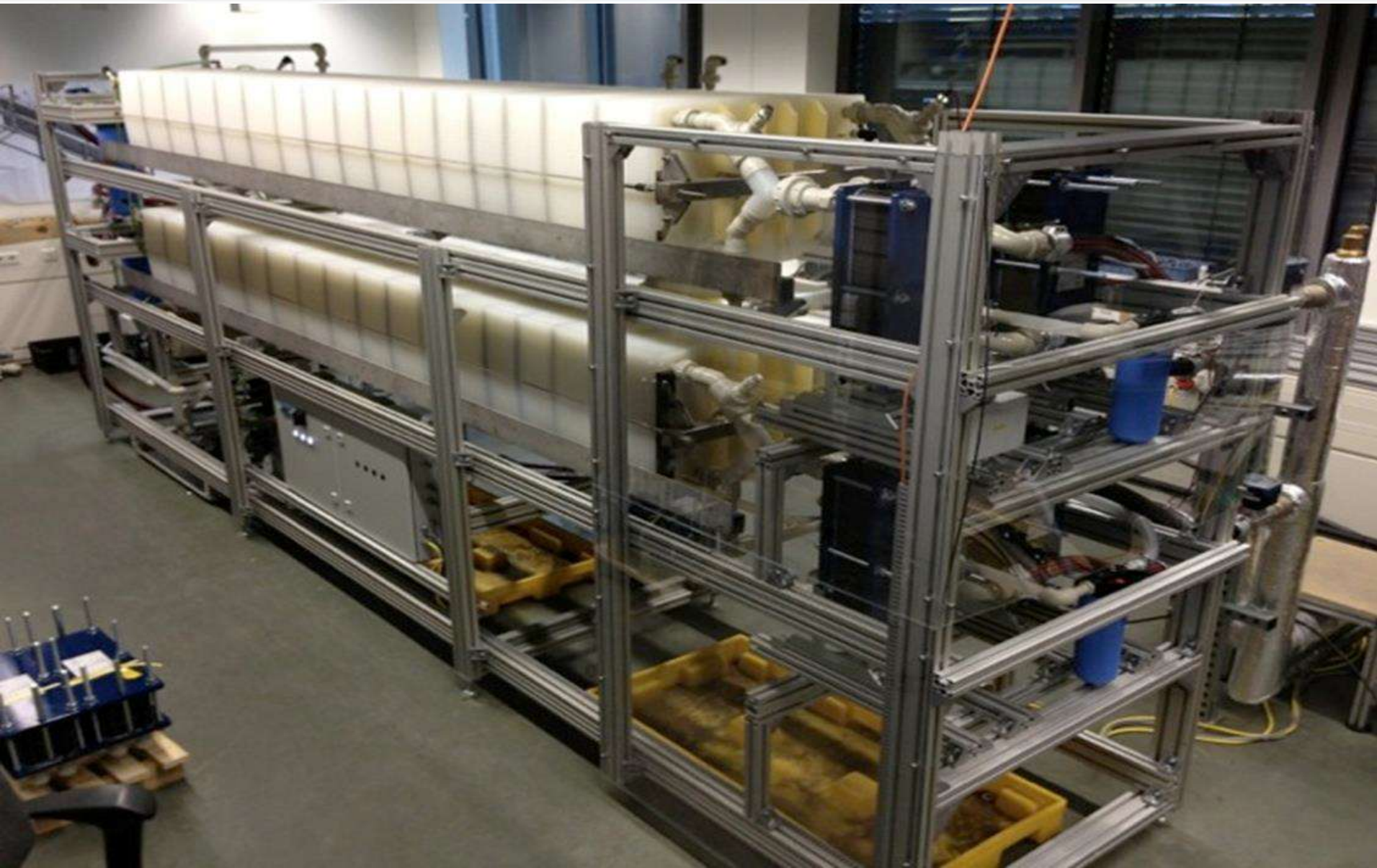


Eliminates the need for HP Pump, its capex, maintenance and Energy costs

Reduces the overall cost of additional permeate recovery

ROCHEM – Waste Heat Evaporator (WHE)

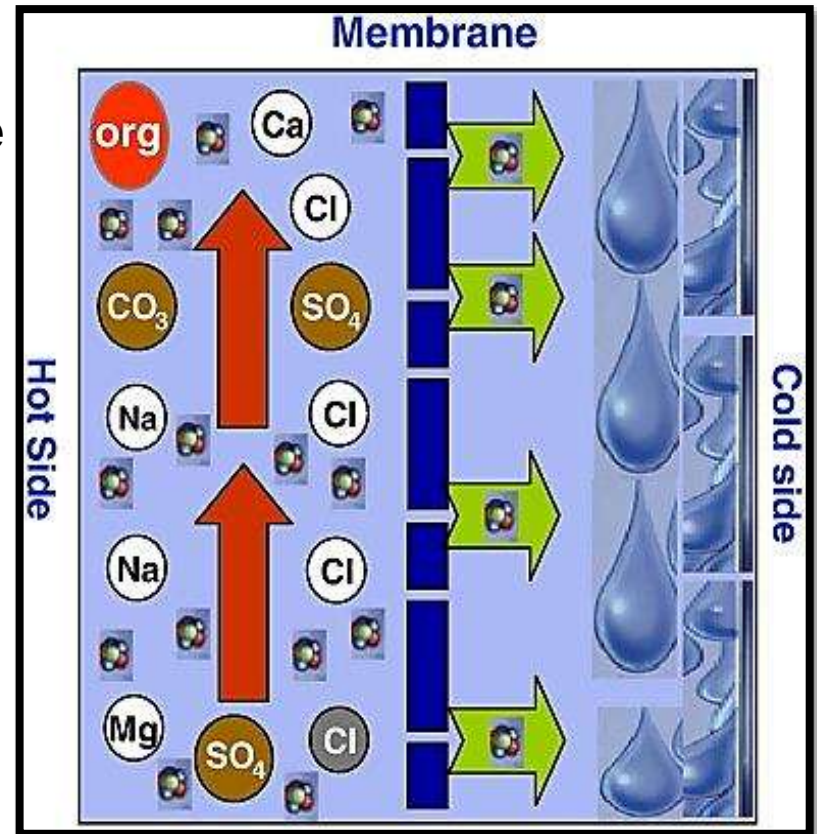
ROCHEM
SEPARATION SYSTEMS



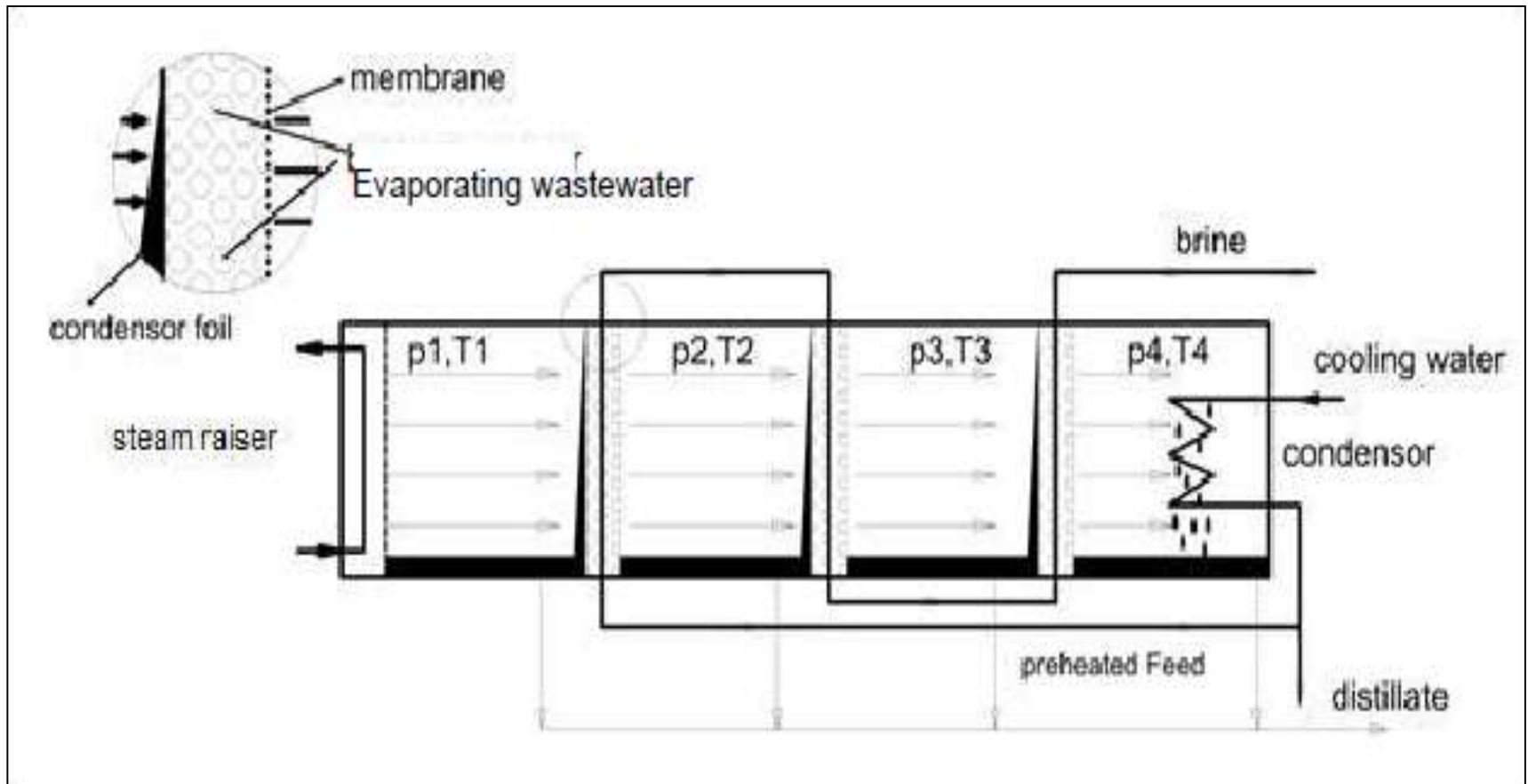
Process of concentration in WHE

Wastewater is Concentrated in the following way:

1. Heat is transported from the bulk fluid to the wastewater surface
2. Wastewater evaporates from the surface
3. Wastewater vapour diffuses through the membrane
4. Wastewater vapour condenses on the other side of the membrane



Process Schematic of ROCHEM – Waste Heat Evaporator (WHE)



ECONOMICAL AND ENERGY EFFICIENT

Any waste heat source can be utilized. **A fresh source of steam is not necessary.**

Lower Electrical Power consumption than Multi-effect Evaporators.

Possible sources of heat that can be used to evaporate waste water in MMEE

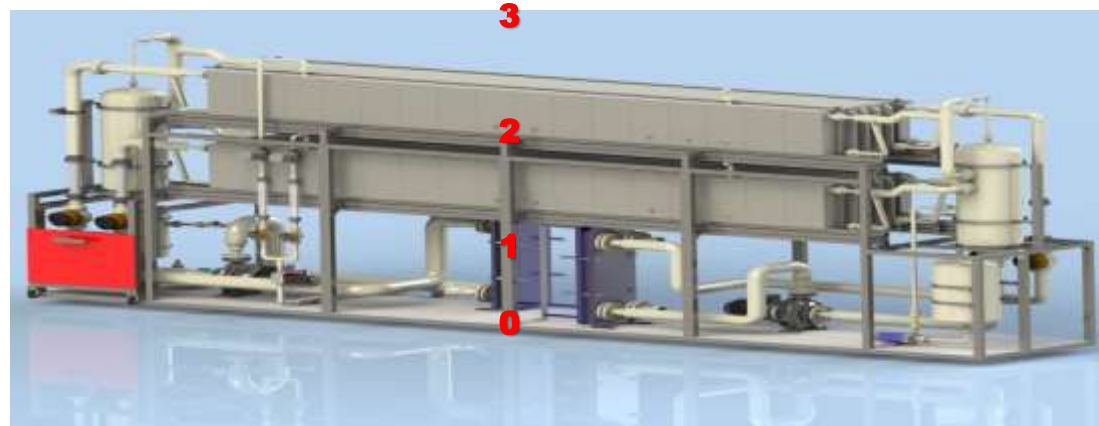




Conventional MEE

12
11
10
9
8
7
6
5
4
3
2
1
0

Comparison of Height of installation and Structural Work required



WHE

Advantages – ROCHEM – Waste Heat Evaporator (WHE)

- **ECONOMICAL AND ENERGY EFFICIENT**

The waste heat source can be utilized. A fresh source of steam is not necessary. Lower Electrical Power consumption than Multi-effect Evaporators.

- **Lower Capital Costs:**

Special Metallurgy for construction of unit is not required, thus resulting in lower capital costs.

- **Safe operations :**

Low operating pressure, hence increased process safety. Also operates at lower Temperatures than conventional Evaporators.

- **Longer Equipment Life and Lower Maintenance**

Due to MOC which is engineered PP , Limits scaling and corrosion issues.

- **Consistent and High Quality of Distillate**

The vapour and liquid phase are separated by Membranes, hence ensures High quality of distillate at all times. PLC based Automated Process Control ensures High Operational efficiency.

- **Process Reliability:**

Stable operations and Reduced Sensitivity towards concentration polarization is negligible

Advantages – ROCHEM – Waste Heat Evaporator (WHE)

7. Reduces Equipment Size and Hence lowers foot print:

Reduction in non-condensable species in vapour phase and hence the unit size and weight is reduced considerably compared to conventional Evaporators.

8. Low cost on Structural Supports:

Low initial capital investment as towering support structures are not required as modules are skid mounted at manageable height manually.

9. Easier Maintenance:

The Special Design allows it to be maintained conveniently as module on skid are spread out at ground level.

10. Efficient CIP

The MOC of Specially engineered PP allows the module to be cleaned and soaked in acid and alkali's without corrosion issues, keeping module clean and available for service duty for longer time than conventional evaporators.



Applications of ROCHEM – Waste Heat Evaporator (WHE)

- Zero Liquid discharge for Industrial Wastewater
- Non Volatile acid concentration
- Metal recovery
- Dye Concentration and recovery
- Spent Acid recovery
- Concentration of Lanthate Compounds
- Recovery of volatile compounds
- Fruit juice/Milk/heat sensitive products concentration/separation/recovery
- Various Process application for concentration/distillation/separation/recovery

PAY PER USE

ROCHEM
SEPARATION SYSTEMS



ROSERVE



SERVICE CONCEPT ! Customer Buys nothing.

Customer defines Service need and scope.

Customer only enters into a Service Agreement. (Min 3 to Max 6 year tenure)

Rochem brings to site, best suited Plant & Machinery to meet the Service Need. Client undertakes Civil works (limited due containerised options)

Rochem operates the equipment and provides the Customer the Service of Reducing/Re-cycling effluent volume

Customer pays Rochem agreed Service charges per m3 of permeate produced



ROSERVE



Customer Upfront Capital Investment is NIL (only outflow is security deposit)

Customer Pays only for What He Gets.

Technology, Performance, Obsolescence, Upgrade – ALL RISK OF ROCHEM !

Customer can focus Investment into Production, rather than ETP !

OUR STRENGTHS

SUPERIOR WORLD CLASS TECHNOLOGY

HIGH QUALITY COMPONENTS /

ACCESSORIES

LOWER LIFE CYCLE COST OF SYSTEM

STRONG & GROWING SERVICE NETWORK

TECHNICAL COMPETENCY / STRONG BACK UP

LOCAL SERVICE BACKUP AT LOCATIONS ALL OVER INDIA.

Key message



Customized Solutions....

End to End Solutions for ZLD....

Service Backup

AMC and Comprehensive O&M contracts....

Integration with existing assets to save investments

Leased models

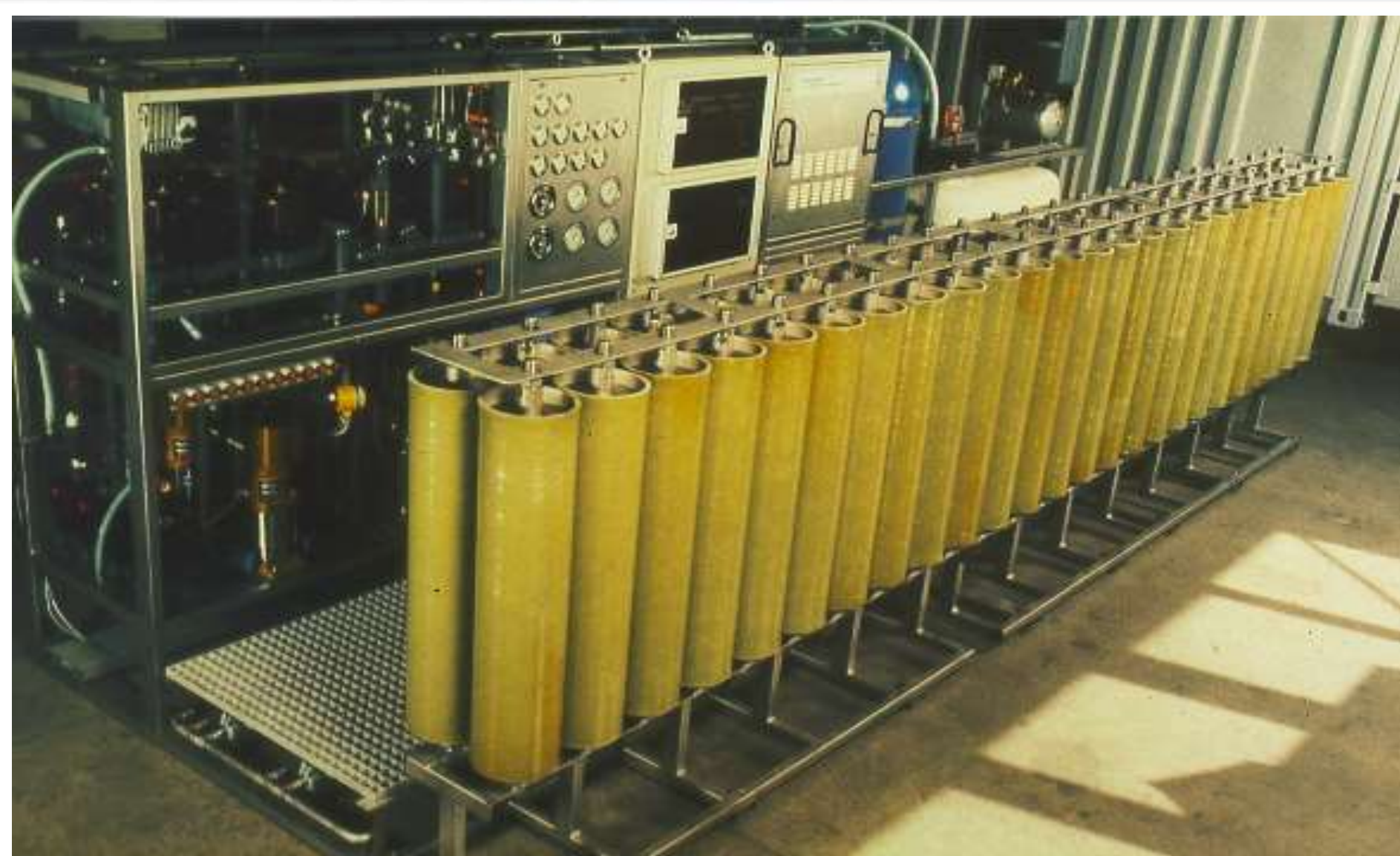
ROCHEM PT-RO SYSTEMS

ROCHEM
SEPARATION SYSTEMS



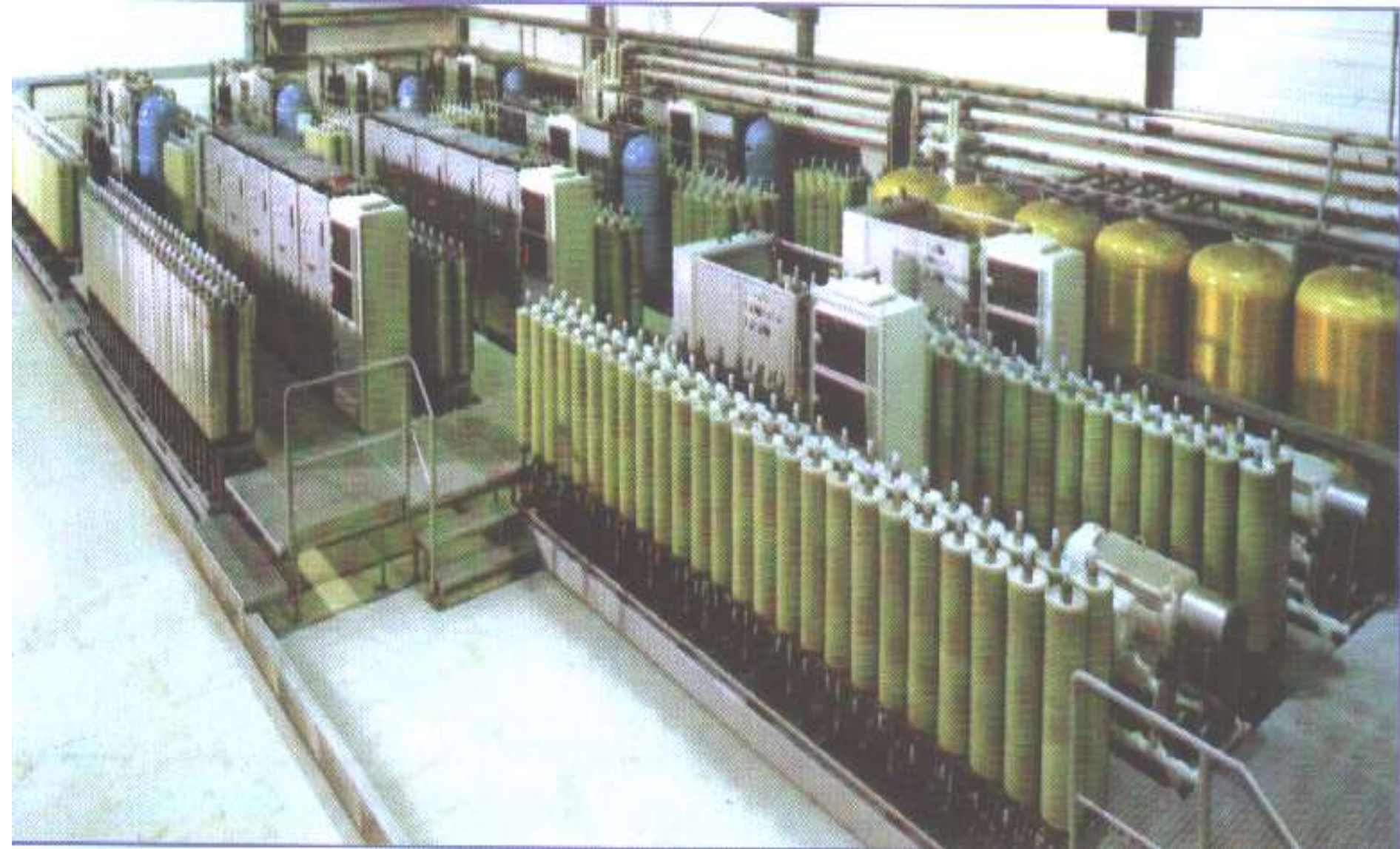
ROCHEM-PT Membrane – THE HEART

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ROCHEM PT-RO SYSTEMS

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ROCHEM HIGH PRESSURE PT-RO SYSTEMS

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MOBILE DESALINATION UNIT



**SERVING THE DEFENSE FORCES
FOR 2 DECADES**

ROCHEM
SEPARATION SYSTEMS

MOBILE UNITS IN ARMY



10.12 11:51

Portable, easy to deploy systems offer greater reach and mobility

ROCHEM
SEPARATION SYSTEMS



Our esteemed customers include Indian Army, Indian Navy, Indian Coast Guard, Border Security Force, Shipping Corporation of India, BARC etc.

WHE installation

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INSTALLATION OF Waste Heat Evaporator (WHE)



Rochem Installations in CETPs

SN.	CUSTOMER	CAPACITY
1	Karaipudur Common Effluent Treatment Plant (P) Ltd., Tirupur	690 M ³ /day
2	Mannarai Common Effluent Treatment Plant (P) Ltd., Tirupur	690 M ³ /day
3	Ranitech CETP, Ranipet, Vellore, Tamil Nadu	PT(HP)-RO: 500 M ³ /day
4	Koparkhairne CETP	PTRO:100 cum/day
5	SMS Infrastructure Limited (Amravati CETP) - dye bath	HPRO: 500 M ³ /day
6	SMS Infrastructure Limited (Amravati CETP)	Hybrid-RO: 2700 M ³ /day
7	SMS Infrastructure Limited (Amravati CETP)	HPRO: 338 M ³ /day
8	SMS Infrastructure Limited (Amravati CETP)	PTRO: 675 M ³ /day

Rochem installations to recycle > 1MLD capacity plants

Sr. No.	Client	Capacity (cum/day)	System
1	Radico Khaitan Ltd. (Unit- Rampur)	1176	Hybrid
2	Grasim Industries Ltd., Nagda	2600	Hybrid
3	Grasim Industries Ltd., Nagda	3500	Hybrid
4	Disti Chemi Process Engineering Pvt. Ltd. for M/s. Pad. Dr. Vikhe Patil SSK Ltd., Ahmednagar	1523	Hybrid
5	Concord Enviro FZE - Honest Derivatives, Jalgaon	1100	PTRO
6	Concord Enviro FZE - Honest Derivatives, Jalgaon	1100	PTRO
7	Tata Motors, chikali	1600	Hybrid
8	Continental Carbon India Ltd., Ghaziabad, U.P.	1340	PTRO
9	Jubilant Organosys Ltd., Gajraula, U. P.	1350	PTRO
10	Jubilant Organosys Ltd., Gajraula, U. P.	1200	PTRO
11	N.V. Distilleries & Breweries Ltd., U.P.	1000	SPRO
12	Roquette Riddhi Siddhi Pvt. Ltd. Uttarakhand	1500	PTRO
13	Gulshan Polyols Ltd., Jhagadia	1100	PTRO
14	Gujarat Ambuja Exports Ltd., Hubli	1100	Hybrid
15	Kasyap Sweetners Ltd., Badnawar	1100	PTRO
16	Roquette Riddhi Siddhi Pvt. Ltd., Gokak	1350	PTRO
17	Roquette Riddhi Siddhi Pvt. Ltd., Gokak	1722	SPRO

Rochem installations to recycle > 1MLD capacity plants – contd..

Sr. No.	Client	Capacity (cum/day)	System
18	STRIDES SHASUN LTD., Pondicherry	1105	Hybrid
19	BHOPAL GLUES & CHEMICALS PVT. LTD., M.P.	1100	PTRO
20	Biocon India Ltd., Bangalore	1400	PTRO
21	K G Denim Ltd., Coimbatore	1200	PTRO
22	Raymond Ltd., Yavatmal, Maharashtra	1200	(FM–UF System)
23	SMS Envirocare (Amravati CETP)	2700	Hybrid
24	Kanchan India Ltd., (Cotton Div)	1400	Hybrid
25	Jubilant Organosys Ltd. Gajraula	1200	Hybrid
26	Saf Yeast Company Pvt. Ltd., Sandila, Phase V	1060	SPRO
27	Saf Yeast Company Pvt. Ltd., Chiplun	1100	SPRO
28	Grasim Industries Ltd. Karnataka 1st Plant	3350	Hybrid
29	Grasim Industries Ltd. Karnataka 2nd Plant	3350	Hybrid
30	Saf Yeast Company Pvt. Ltd., Sandila (Phase-V)	1400	HPRO
31	Archean Chemical Industries Pvt Ltd	1500	permeate capacity
32	Hetero Infrastructure S.E.Z. Ltd	2500	PTRO
33	Syngenta India Limited	2500	PTRO
34	Bindal Paper Mill, U. P. (under execution)	4400	Hybrid-RO
35	Bindal Paper Mill, U. P. (under execution)	1100	Hybrid-RO
36	Maral Overseas Limited, M.P. (under execution)	1400	Hybrid-RO

Rochem installations of WHE/MEE

Sr. No.	Client	Capacity (cum/day)	System
1	Bosch Ltd, Nasik, Maharashtra	10 cum/day	WHE + Crystalliser
2	Tata Steel Ltd, Tarapur, Maharashtra	14 cum/day	WHE + ATFD
3	Viswaat Chemicals Ltd, Ambernath, Maharashtra	4 cum/day	WHE + Double drum dryer
4	Johnson & Johnson Ltd, Hyderabad, A.P	10.8 cum/day	WHE + ATFD
5	North West Bio Energy, Canada	14.7 cum/day	WHE
6	The Ruby Mills Ltd (Under Execution), Kharsundi, Maharashtra	25 cum/day	WHE
7	ACC, Wadi	50 cum/day	MEE + Crystallizer
8	ACC, Chandrapur	50 cum/day	MEE + Crystallizer
9	ACC, Bhatapara	50 cum/day	MEE + Crystallizer
10	SRF, Tamilnadu	2 cum/hr	MEE
11	Ispat Industries Ltd., Nagpur	150 cum/day	MEE
12	Ruby Mills	25 cum/day	WHE
13	Symbiotec Pharmalab Pvt Ltd	30 cum/day	WHE
14	Maral Overseas Limited, (M. P.)	100 cum/day	MEE + Crystallizer
15	Indofil Industries Ltd	4 cum/day	WHE + ATFD

Rochem ZLD Installations

Sr. No.	Client	RO	Capacity	RR (%)
1	Viswaat Chemicals	RO-I	60 cum/day	85
		RO-II	9 cum/day	60
		WHE	4 cum/day	
2	Tata Steel, Tarapur	PT-RO	221 cum/day	85
		HP-RO	33 cum/day	60
		SP-RO	208 cum/day	90
		WHE	13 cum/day	
3	Bosch, Nashik	PT-RO	222 cum/day	85
		PT-RO	34 cum/day	50
		HP-RO	17 cum/day	45
		SP-RO	212 cum/day	90
		WHE	10 cum/day	
4	ACC, Wadi +Chanda + Bhatapara	De-silication	600 cum/day	
		PT-RO	662 cum/day	80-85
		PT-RO	100 cum/day	45-50
		SP-RO	612 cum/day	90
		MEE	50 cum/day	

Rochem ZLD Installations

Sr. No.	Client	RO	Capacity	RR (%)
5	SRF, Tamilnadu	PT-RO	8 cum/hr	80-85%
		MEE	2 cum/hr	
6	Ispat Industries Ltd., Nagpur	PT-RO	150 cum/day	70%
		MEE	150 cum/day	
6	The Ruby Mills Ltd.	RO-I	1000 cum/day	85
		WHE	25 cum/day	
7	Maral Overseas Limited, M.P.	ETP	2 × 1400 cum/day	
		RO-I	1400 cum/day	80
		RO-II	296 cum/day	55
		Polishing RO	163 cum/day	90%
		MEE + Crystallizer	100 cum/day	

Let us join hands to ...



.. achieve Zero Discharge

.. conserve large quantity of water

.. conserve Energy

.. conserve Capex

.. preserve the Environment

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