CLEANER WATER
GREENER TOMORROW
SUSTAINABLE INDUSTRY

Rain Power
WATER | TECHNOLOGY | A CLEANER FUTURE

ZERO LIQUID DISCHARGE
ZLD SYSTEMS

From Wastewater to a Brighter Tomorrow

50 KLD | 100 KLD | 150 KLD

High-Recovery Industrial Water Reuse Systems

ETP + UF + RO-1 + RO-2 + RO-3 + MEE / MVR + ATFD

- **95%** Water Recovery Target
- **MEE & MVR** Options
- Recovered Water for Reuse
- Dry Salt / Solids Handling



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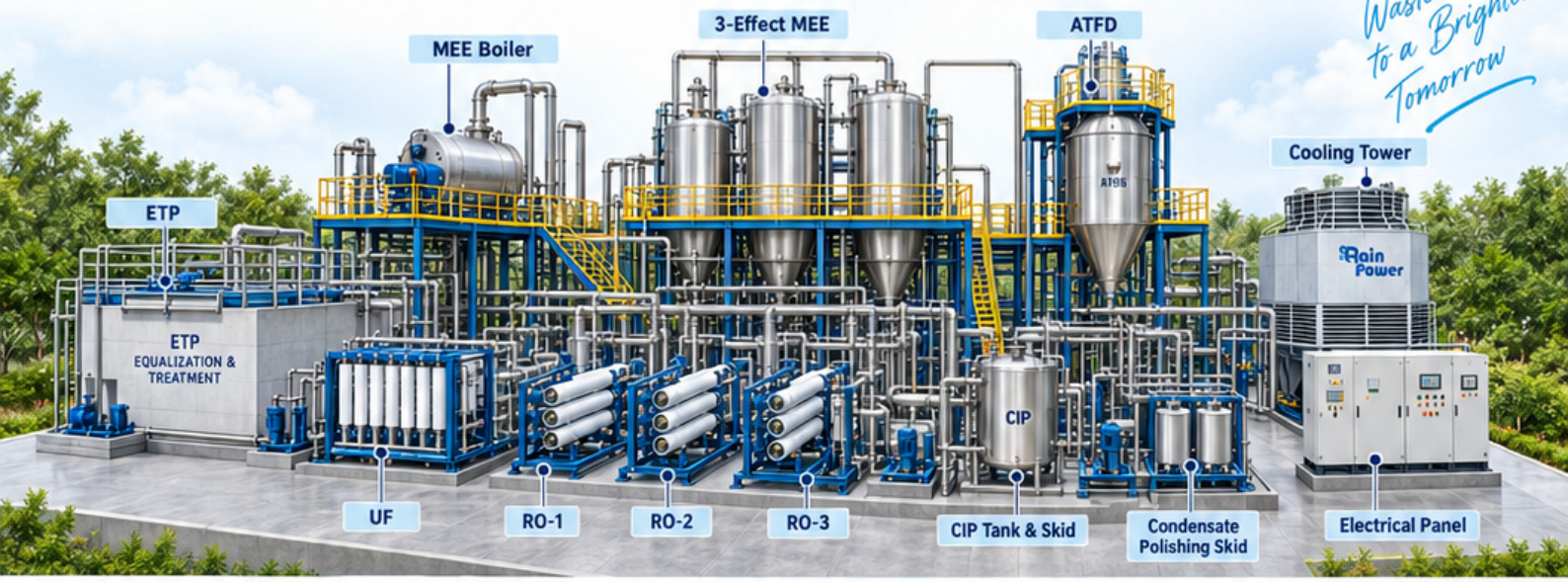
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50 KLD ZLD SYSTEM

3-STAGE RO + 3-EFFECT MEE + ATFD

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1 ETP (Equalization & Treatment)

Screening, equalization, physico-chemical treatment

₹ 14.35 Lakh



2 UF (Ultrafiltration)

UF system with pumps & accessories

₹ 4.77 Lakh



3 RO-1 (First Stage RO)

High pressure RO system (Stage-1)

₹ 5.85 Lakh



4 RO-2 (Second Stage RO)

High pressure RO system (Stage-2)

₹ 3.15 Lakh



5 RO-3 (Third Stage RO)

High pressure RO system (Stage-3)

₹ 2.10 Lakh



6 Common CIP & Tanks

CIP system with chemical tanks & transfers

₹ 1.98 Lakh



7 ATFD (Agitated Thin Film Dryer)

ATFD with feed system, vapour handling

₹ 12.27 Lakh



8 Cooling Tower

FRP cooling tower with pumps & piping

₹ 1.46 Lakh



9 Condensate Polishing

Mixed bed / polishing unit with pumps & instrumentation

₹ 1.30 Lakh



10 Installation / Integration / Electrical / Engineering

Erection, interconnection, cabling, instrumentation & engineering

₹ 8.24 Lakh



11 3-Effect MEE (Evaporation)

3-effect falling film MEE with pumps, condensers & accessories

₹ 20.05 Lakh



12 MEE Boiler

Thermal oil / steam boiler with accessories

₹ 5.48 Lakh

50 KLD MEE BASED COMPLETE ZLD PLANT – ₹ 81,00,000

TECHNICAL OVERVIEW

Capacity	Operating Basis	Average Feed	RO Configuration	Overall Recovery Target	Final Concentrate	Thermal Route
50 KLD	20 h/day	2.50 m³/h	3 Stage	95%	ATFD	3-Effect MEE

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50 KLD ZLD SYSTEM

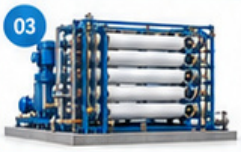
3-STAGE RO + MVR + ATFD

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PACKAGE BREAKDOWN (50 KLD ZLD PLANT)

MODULAR PACKAGES | PROVEN TECHNOLOGY | EASY INTEGRATION

01  **ETP** Equalization & Treatment Package **₹ 13.92 Lakh**	02  **UF** Ultrafiltration Package **₹ 4.63 Lakh**	03  **RO-1** First Stage RO Package **₹ 5.67 Lakh**
04  **RO-2** Second Stage RO Package **₹ 3.06 Lakh**	05  **RO-3** Third Stage RO Package **₹ 2.04 Lakh**	06  **Common CIP & Tanks** CIP System, Chemical Dosing & Storage Tanks **₹ 1.92 Lakh**
07  **ATFD** Agitated Thin Film Dryer Package **₹ 11.90 Lakh**	08  **Cooling Tower** Cooling Tower Package **₹ 1.42 Lakh**	09  **Condensate Polishing** DM / Polishing Unit Package **₹ 1.27 Lakh**
10  **Installation / Integration / Electrical / Engineering** Erection, Piping, Electrical, Instrumentation & Engineering **₹ 7.98 Lakh**	11  **MVR Package** MVR Evaporator & Mechanical Vapour Compressor **₹ 30.53 Lakh**	12  **MVR Startup / Trim Boiler** Startup Boiler Package (Fuel based) **₹ 3.66 Lakh**

50 KLD MVR BASED COMPLETE ZLD PLANT – ₹ 88,00,000

TECHNICAL PARAMETERS (BASIC DESIGN)

Capacity **50 KLD**	Operating Basis **20 h/day**	Average Feed **2.50 m³/h**	RO Configuration **3 Stage**	Overall Recovery Target **95%**	Thermal Route **MVR**	Final Solids Handling **ATFD**

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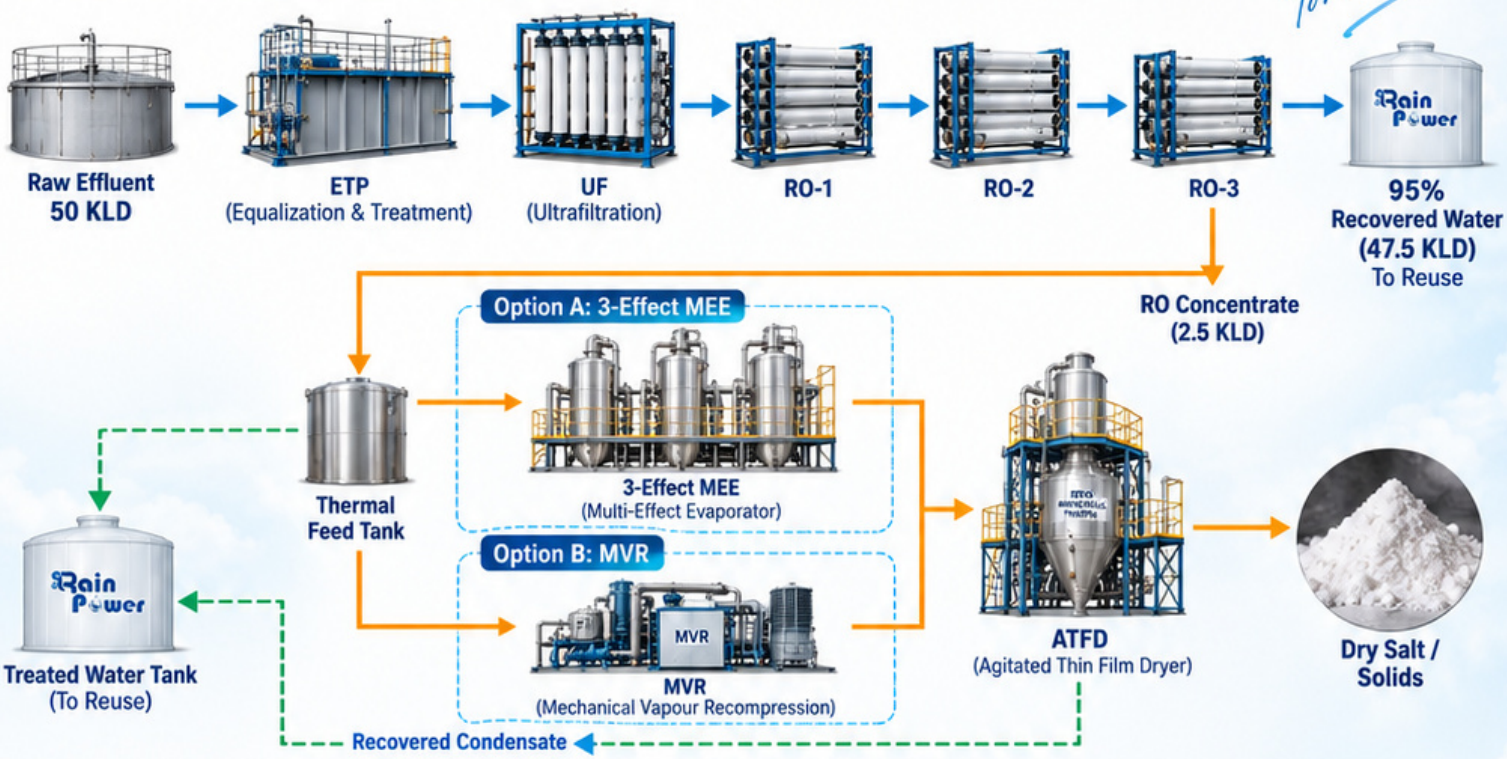
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50 KLD ZLD

PROCESS FLOW & RUNNING COST COMPARISON

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PROCESS FLOW DIAGRAM (50 KLD ZLD)





MEE Route Complete Price **₹81,00,000**



MVR Route Complete Price **₹88,00,000**

RUNNING COST COMPARISON (PER DAY)

Cost Head	MEE Route (₹/day)	MVR Route (₹/day)
Electricity	₹ 3,900	₹ 5,200
Steam / Fuel or Startup Heat	₹ 9,800	₹ 2,800
Chemicals / CIP	₹ 1,200	₹ 1,100
Manpower	₹ 2,000	₹ 2,000
Maintenance	₹ 900	₹ 1,100
Salt / Sludge Handling	₹ 700	₹ 700
Total OPEX	**₹ 18,500 / day**	**₹ 12,900 / day**
OPEX (₹/KL of raw effluent)	**₹ 370 / KL**	**₹ 258 / KL**

Assumptions:
Benchmark basis: 20 h/day operation, indicative industrial utility tariff, 95% recovery design objective.

Comparison:
MEE = lower CAPEX, higher steam dependence.
MVR = higher CAPEX, lower continuous steam dependence, potential long-term OPEX advantage.

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100 KLD ZLD SYSTEM

3-STAGE RO + 3-EFFECT MEE + ATFD

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1. ETP
Equalization & Treatment Package
₹ 24.45 Lakh



2. UF
Ultrafiltration Package
₹ 8.13 Lakh



3. RO-1
First Stage RO Package
₹ 9.96 Lakh



4. RO-2
Second Stage RO Package
₹ 5.37 Lakh



5. RO-3
Third Stage RO Package
₹ 3.58 Lakh



6. Common CIP & Tanks
CIP System & Storage Tanks
₹ 3.37 Lakh



7. ATFD
Agitated Thin Film Dryer Package
₹ 20.91 Lakh



8. Cooling Tower
Cooling Tower Package
₹ 2.49 Lakh



9. Condensate Polishing
Condensate Polishing (DM / Mixed Bed)
₹ 2.22 Lakh



10. Installation / Integration / Electrical / Engineering
Erection, Piping, Electrical, Instrumentation & Engineering
₹ 14.03 Lakh



11. 3-Effect MEE
3-Effect MEE Evaporation System
₹ 34.16 Lakh



12. MEE Boiler
MEE Boiler & Thermal System
₹ 9.33 Lakh

100 KLD MEE BASED COMPLETE ZLD PLANT ₹ 1,38,00,000

TECHNICAL OVERVIEW

Capacity	Operating Basis	Average Feed	RO Configuration	Overall Recovery Target	Thermal Route	Final Concentrate
100 KLD	20 h/day	5.00 m³/h	3 Stage	95%	3-Effect MEE	ATFD

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100 KLD ZLD SYSTEM

3-STAGE RO + MVR + ATFD

COMPLETE SOLUTION FOR HIGH-RECOVERY INDUSTRIAL WATER REUSE

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01 **ETP PACKAGE** Screening, equalization, physico-chemical treatment **₹ 24.04 Lakh**	02 **UF PACKAGE** Ultrafiltration system with pumps & accessories **₹ 7.99 Lakh**	03 **RO-1 PACKAGE** 1st stage reverse osmosis with high-pressure pumps **₹ 9.79 Lakh**
04 **RO-2 PACKAGE** 2nd stage reverse osmosis with pumps & accessories **₹ 5.28 Lakh**	05 **RO-3 PACKAGE** 3rd stage reverse osmosis with pumps & accessories **₹ 3.52 Lakh**	06 **COMMON CIP & TANKS** CIP system, chemical dosing tanks & utility tanks **₹ 3.31 Lakh**
07 **ATFD PACKAGE** Agitated Thin Film Dryer with solids handling system **₹ 20.56 Lakh**	08 **COOLING TOWER** FRP cooling tower with pumps & piping **₹ 2.45 Lakh**	09 **CONDENSATE POLISHING** Mixed bed / DM system for distillate polishing **₹ 2.19 Lakh**
10 **INSTALLATION / INTEGRATION / ELECTRICAL / ENGINEERING** Erection, piping, electrical, instrumentation & engineering **₹ 13.79 Lakh**	11 **MVR PACKAGE** MVR evaporator, compressor, condensers, auxiliaries **₹ 52.75 Lakh**	12 **MVR STARTUP / TRIM BOILER** Startup / trim boiler with fuel system & accessories **₹ 6.33 Lakh**

TECHNICAL PARAMETERS (100 KLD ZLD SYSTEM)

Capacity	Operating Basis	Average Feed	RO Configuration	Overall Recovery Target	Thermal Route	Final Solids Handling
100 KLD	20 h/day	5.00 m³/h	3 Stage	95%	MVR	ATFD

100 KLD MVR BASED COMPLETE ZLD PLANT | ₹ 1,52,00,000

Higher Recovery A Cleaner Tomorrow

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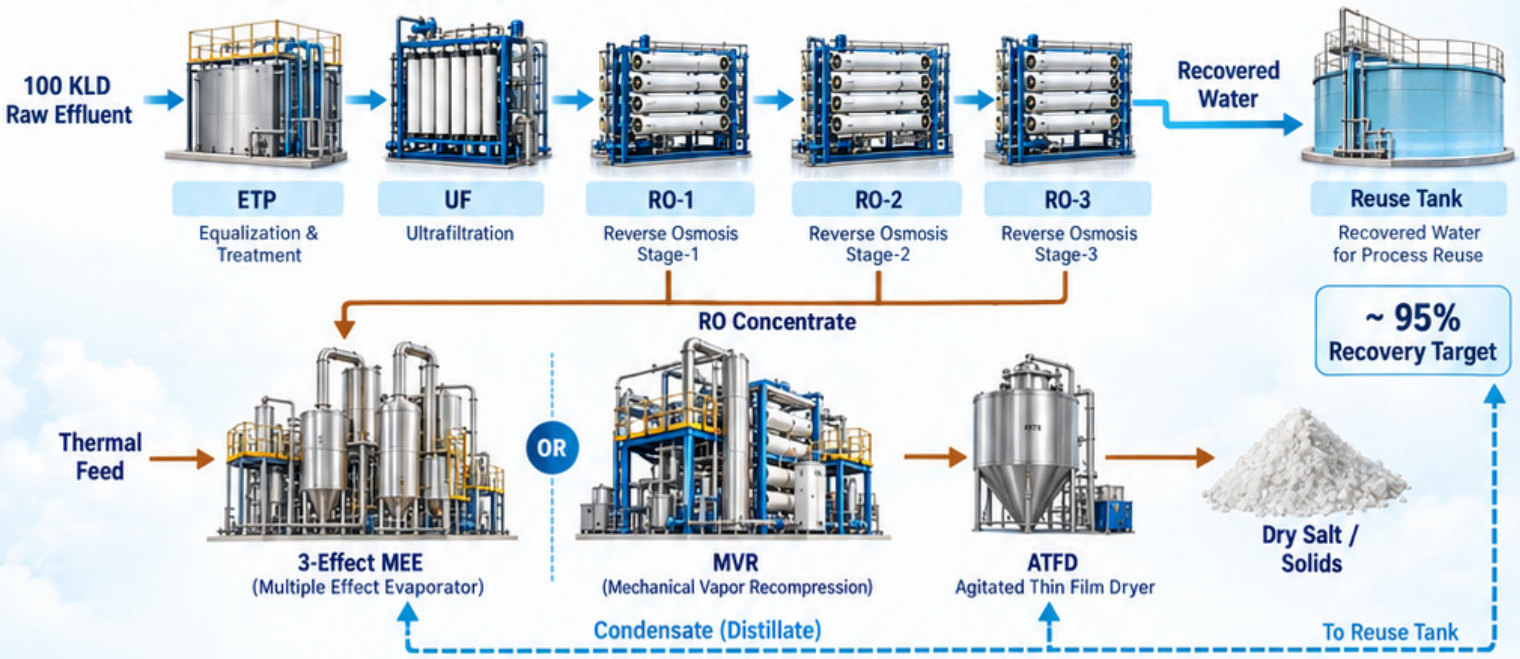
100 KLD ZLD

PROCESS FLOW & RUNNING COST COMPARISON

INTEGRATED TREATMENT | MAXIMUM RECOVERY | ZERO LIQUID DISCHARGE

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PROCESS FLOW DIAGRAM (100 KLD ZLD)



CAPITAL INVESTMENT COMPARISON (100 KLD ZLD)



MEE Based

100 KLD ZLD System
(ETP + UF + RO-1 + RO-2 + RO-3 + 3-Effect MEE + ATFD)

₹ 1,38,00,000
Total Project Cost (INR)



MVR Based

100 KLD ZLD System
(ETP + UF + RO-1 + RO-2 + RO-3 + MVR + ATFD)

₹ 1,52,00,000
Total Project Cost (INR)

RUNNING COST COMPARISON

Particulars	MEE Based (₹ / day)	MVR Based (₹ / day)	Unit / Notes
Electricity	4,424	5,280	₹ / day
Steam / Fuel or Startup Heat	18,600	5,200	₹ / day
Chemicals / CIP	2,400	2,200	₹ / day
Manpower	2,800	2,800	₹ / day
Maintenance	1,600	2,000	₹ / day
Salt / Sludge Handling	1,200	1,200	₹ / day
Total OPEX	**₹ 31,024 / day**	**₹ 18,680 / day**	₹ / day
OPEX (Per KL Treated)	**₹ 310 / KL**	**₹ 187 / KL**	₹ / KL

Benchmark basis: 20 h/day operation, indicative industrial utility tariff, 95% recovery design objective.

95% Recovery Target | Water Reuse for a Sustainable Future | Zero External Liquid Discharge by Design

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150 KLD ZLD SYSTEM

3-STAGE RO + 3-EFFECT MEE + ATFD

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01 

ETP PACKAGE
Equalization, Treatment & Clarification
₹ 32.25 Lakh

02 

UF PACKAGE
Ultrafiltration System with Accessories
₹ 12.53 Lakh

03 

RO-1 PACKAGE
1st Stage RO System with High Pressure Pumps
₹ 23.13 Lakh

04 

RO-2 PACKAGE
2nd Stage RO System with Pumps & Instruments
₹ 6.78 Lakh

05 

RO-3 PACKAGE
3rd Stage RO System with Pumps & Instruments
₹ 4.52 Lakh

06 

COMMON CIP & TANKS
CIP System, Chemical Dosing & Storage Tanks
₹ 6.18 Lakh

07 

ATFD PACKAGE
Agitated Thin Film Dryer with Ancillaries
₹ 25.73 Lakh

08 

COOLING TOWER PACKAGE
Cooling Tower with Pumps & Piping
₹ 3.68 Lakh

09 

CONDENSATE POLISHING
Mixed Bed / DM Plant with Accessories
₹ 2.45 Lakh

10 

INSTALLATION / INTEGRATION ELECTRICAL / ENGINEERING
Erection, Piping, Electrical, Instrumentation & Engineering
₹ 11.16 Lakh

11 

3-EFFECT MEE PACKAGE
3-Effect Evaporation System with Auxiliaries
₹ 41.03 Lakh

12 

MEE BOILER PACKAGE
Steam Boiler for MEE with Accessories
₹ 8.56 Lakh

₹ | 150 KLD MEE BASED COMPLETE ZLD PLANT – ₹ 1,78,00,000

TECHNICAL HIGHLIGHTS

Capacity	Operating Basis	Average Feed	RO Configuration	Overall Recovery Target	Thermal Route	Solids Route
150 KLD	20 h/day	7.50 m³/h	3 Stage	95%	3-Effect MEE	ATFD

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150 KLD ZLD SYSTEM

3-STAGE RO + MVR + ATFD

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1. ETP PACKAGE
Equalization, treatment & transfer
₹ 31.70 Lakh



2. UF PACKAGE
Ultrafiltration system
₹ 12.32 Lakh



4. RO-2 PACKAGE
Second stage RO system
₹ 6.66 Lakh



7. ATFD PACKAGE
Agitated Thin Film Dryer (complete system)
₹ 25.30 Lakh



3. RO-1 PACKAGE
First stage RO system
₹ 22.73 Lakh



5. RO-3 PACKAGE
Third stage RO system
₹ 4.44 Lakh



8. COOLING TOWER PACKAGE
Cooling tower with pumps & accessories
₹ 4.20 Lakh



11. MVR PACKAGE
MVR compressor, vessels, heat exchangers & auxiliaries
₹ 54.68 Lakh



6. COMMON CIP & TANKS
CIP system, chemical tanks & transfer pumps
₹ 6.08 Lakh



9. CONDENSATE POLISHING
Polishing filters & DM quality system
₹ 2.80 Lakh



10. INSTALLATION / INTEGRATION ELECTRICAL / ENGINEERING
Installation, integration, electricals & engineering
₹ 15.57 Lakh



12. MVR STARTUP / TRIM BOILER
Startup boiler, fuel system & auxiliaries
₹ 5.52 Lakh

150 KLD MVR BASED COMPLETE ZLD PLANT – ₹ 1,92,00,000

TECHNICAL PARAMETERS

Capacity	Operating Basis	Average Feed	RO Configuration	Overall Recovery Target	Thermal Route	Final Solids Handling
150 KLD	20 h/day	7.50 m³/h	3 Stage	95%	MVR	ATFD

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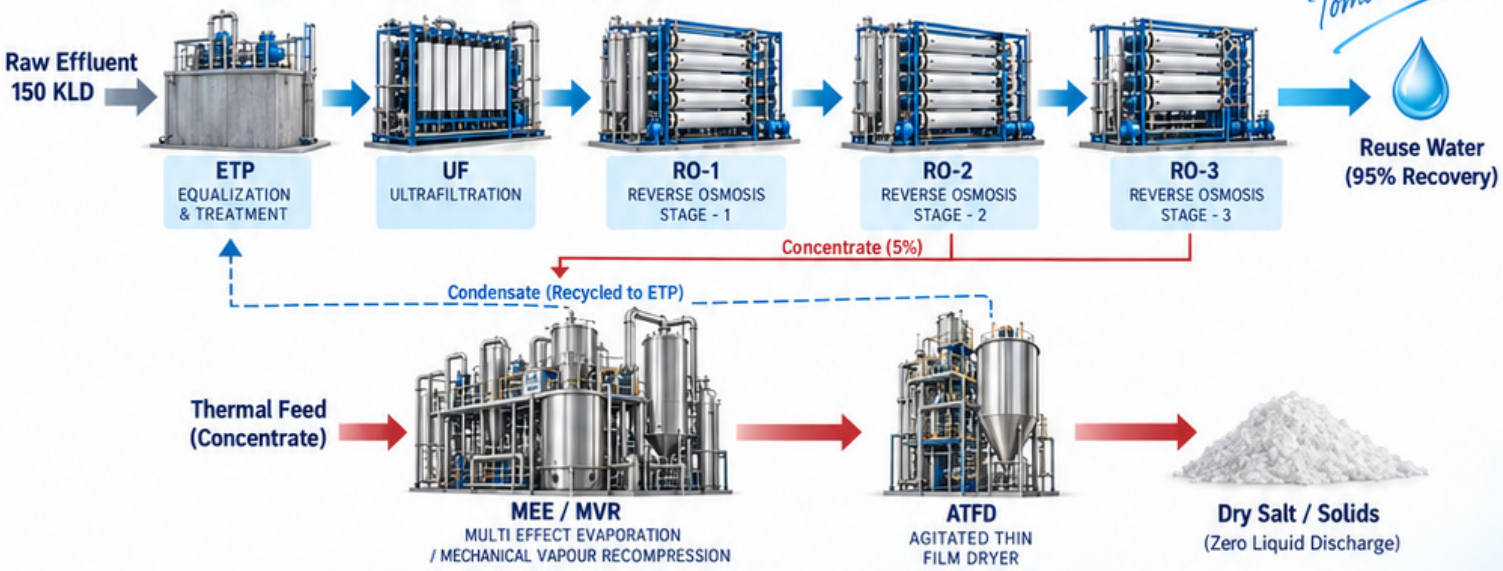
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150 KLD ZLD

PROCESS FLOW, RUNNING COST & COMMERCIAL SUMMARY

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PROCESS FLOW DIAGRAM (150 KLD)



MEE Based Complete ZLD

₹ 1,78,00,000

(Rupees One Crore Seventy Eight Lakh Only)

MVR Based Complete ZLD

₹ 1,92,00,000

(Rupees One Crore Ninety Two Lakh Only)

RUNNING COST (OPEX) – 150 KLD (PER DAY)

Cost Head	MEE (₹/day)	MVR (₹/day)
Electricity	₹6,700	₹8,000
Steam / Fuel or Startup Heat	₹26,800	₹7,000
Chemicals / CIP	₹3,300	₹3,000
Manpower	₹3,600	₹3,600
Maintenance	₹2,300	₹2,700
Salt / Sludge Handling	₹1,800	₹1,800
Total OPEX	**₹ 44,500/day**	**₹ 26,100/day**
OPEX (₹/KL)	**₹ 297/KL**	**₹ 174/KL**

Benchmark basis: 20 h/day operation, indicative industrial utility tariff and 95% recovery design objective. Actual OPEX depends on feed-water quality, utility tariff and plant operation.

THANK YOU

ZERO LIQUID DISCHARGE SOLUTIONS — 50 KLD | 100 KLD | 150 KLD

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Partnering for a Sustainable Tomorrow

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