Bosch Manufacturing Solutions | BMG

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BMG Pure Water Systems

MVR-based Water Purification for challenging water sources

Why this is on the agenda in India

Pollution-control norms are pushing industries toward zero liquid discharge (ZLD), tighter reuse and controlled reject handling. Compact MVR evaporation is one of the core building blocks for concentrating RO reject and other difficult streams – at a scale below full ZLD plants, without a steam boiler or major civil works.

Three factors driving water decisions at industrial sites

Growing pressure on water resources

Freshwater is becoming harder to secure near many industrial sites. At the same time, expectations for water reuse are increasing. Recovered water is increasingly seen as a valuable resource rather than waste.

Stricter discharge requirements

Discharge requirements are becoming stricter across many industries. Concentrating and reducing liquid effluent is increasingly part of standard compliance planning.

Cost and control of external disposal

Outsourced treatment adds cost, logistics effort and operational risk that grow with every dispatched load. Keeping treatment on site increases control – if the system is sized and operated correctly.

Across India, industrial sites face increasing demands on water management. Success depends on solutions that perform reliably in everyday operation.

Not every water challenge needs a full-scale plant

Compact MVR-based purification up to 3 m^3/h feed – built for sites that need more control without large-scale infrastructure

Where the BMG System fits best

Other systems	Other systems	BMG Pure Purification System
Simple workaround Low control, temporary handling, outsourcing	**Full-scale plants** Larger infrastructure, higher CAPEX, longer implementation	**Compact MVR system** site-specific purification up to 3 m^3/h feed

The question is not whether it can treat water. The question is whether it's the perfect fit for your water, site and operation.

Best fit when

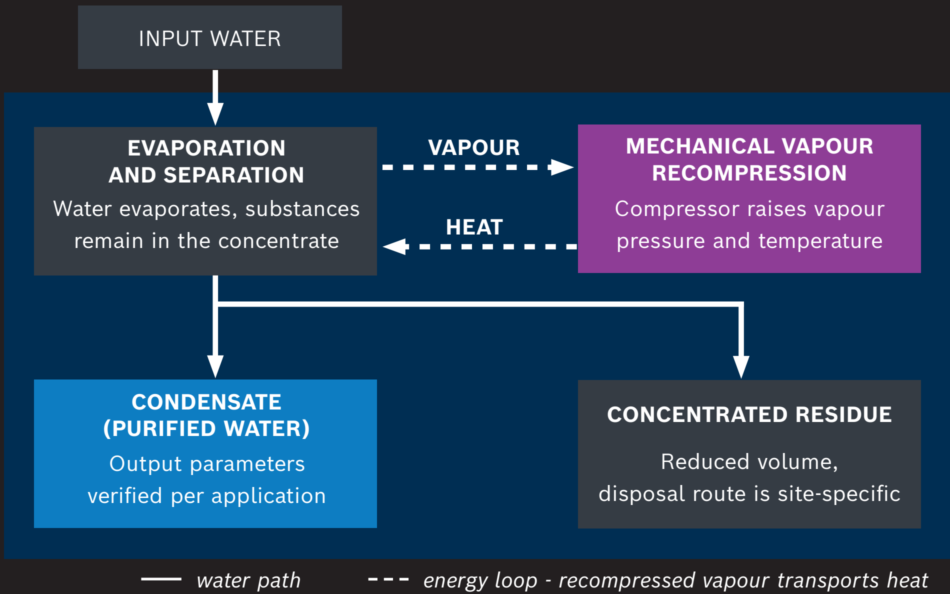
- very strict output water quality requirements
- flow rates up to 3 m^3/h feed per unit
- reliable, predictable operation is essential
- low service effort is preferred
- space is limited
- current treatment, disposal or outsourcing is costly or difficult to control

Not ideal when

- capacity exceeds 3 m^3/h feed per unit
- performance guarantees required before testing real water
- Input water composition is unknown and cannot be tested
- no residue handling solution
- CAPEX prioritized over operating cost

How the system works

MVR-based purification separates water through evaporation and reuses recompressed vapour as a heat source



Vapour is mechanically recompressed and reused as the heat source, which is why MVR typically needs only a fraction of the energy of simple single-effect evaporation.

Typical operating window – verified per application

Specific energy	< 35 kWh per m³ of purified water
Water recovery	up to 90 %, depending on feed and target
Condensate quality	< 15 µS/cm (≈ 8 ppm TDS); on request < 0.1 µS/cm (≈ 0.05 ppm TDS)
Turndown	70 - 100 % of design flow
Power supply	3 × 415 V, 50 Hz — compatible with the Indian grid
Utilities	electricity only; no steam or fuel required

final figures are confirmed after check of your real water data or sample analysis

Proof – not promise

Verifiable references and a defined testing path — before any performance commitment

Reference installation: Bengaluru, India – cooling loop

Feed	Blowdown water from an open cooling loop – airborne dust and contaminants progressively concentrate in the circuit 2500 µS/cm (≈ 1250 ppm TDS)
Capacity	1.3 m^3/h feed
Measured	condensate ≈ 5 ppm TDS power consumption ≈ 30kWh/m^3
Site-specific	urban site, high inlet TDS

Proven in Indian operating conditions

Our reference installations run in Europe and in Bengaluru, India — where an open cooling loop continuously picks up airborne dust and concentrates it in the circuit.

The system keeps the cooling water quality stable, protecting heat-exchanger performance and cooling availability. In practice this reduces make-up water and blowdown, cuts chemical and cleaning costs and helps avoid the efficiency losses and downtime caused by scaling.

Sample testing programme

Send us 2 litres of your stream or water composition analysis report. You receive feedback: achievable condensate quality, concentration factor, energy estimate and residue characterisation — typically within 2-3 weeks.

Implementation path

From first contact to running operation – every step is defined: what you provide, what we deliver & how long it typically takes

01 Feasibility Review

You provide: basic water data, current costs, site constraints

We provide: fit assessment, key technical questions for your case

≈ 1 - 2 weeks

02 Stream Assessment

You provide: raw water sample / analysis & its process context

We provide: feasibility assessment – condensate quality, concentration factor & energy estimate

≈ 2 - 3 weeks

03 Technical Concept & Budget

You provide: required output, reuse / discharge route, utility data

We provide: sizing, layout, residue-handling concept & budget proposal

≈ 2 - 3 weeks

04 Delivery & Commissioning

You provide: site preparation, power, water & internet connection, permits

We provide: installation supervision, commissioning & performance verification on your water

≈ 6 - 8 months

05 Training & Service

You provide: named operators and maintenance windows

We provide: English operator training, service plan, remote diagnostics, spare-parts kit

Timings are typical ranges and depend on water complexity, site readiness and decision speed. Final timing is confirmed per project.

Typical applications to evaluate

Most relevant when the water volume is limited,
but output quality, utilization and operating cost still matter

Industrial process water

For sites with smaller process-water streams that require separation, volume reduction or improved control before reuse or disposal.

Way to verify
Composition | flow profile | required output | residue handling

Wastewater from smaller facilities

For facilities where a large reatment plant is not justified, but the current solution creates cost, compliance or operational pressure.

Way to verify
Daily volume | discharge limits | variability | operator model

Concentrate and difficult water streams

For applications where reducing water volume or separating water from concentrated contaminants may improve the overall process.

Way to verify
Concentration level | output target | energy cost | residue route

Pilot or modular deployment

For companies that want to test a compact treatment route before committing to a larger process change.

Way to verify
Test objective | sampling method | success criteria | timeline

Not every application should start with a large plant.
Some should start with the right test.

Where the business case comes from

The economics depend on current water handling, treatment, disposal, energy and operation costs.

Current situation

- Disposal cost
- Outsourced treatment
- Water losses
- Compliance pressure
- Operating variability

System cost

- Equipment
- Installation
- Energy
- Maintenance
- Service

Value drivers

- Reduced water volume
- Better process control
- Potential reuse route
- Lower dependency on external handling
- Modular deployment

What to calculate

- Cost per m^3
- Energy per m^3
- Residue disposal
- Operating hours
- Payback scenario

Illustrative example – indicative figures, not an offer

Stream	2.8 m^3/h difficult effluent – continuous operation (24 h/day)
Today	external disposal at ₹2,000 per m^3 (tankered)
With MVR	35 kWh/m^3 condensate × ₹8/kWh + maintenance ≈ ₹390 per m^3 all-in
Residue	volume reduced ≈ 7× (≈ 86 % recovery) – disposal applies to concentrate only
Payback	3 years, driven mainly by disposal cost, energy tariff and operating hours

Our approach
We do not recommend calculating return on investment from catalogue data only. The business case should be built from site-specific flow, water quality and cost data.

What it takes to run the system

Operation

automated (PLC); operator attention ≈ 3 h/week

Monitoring

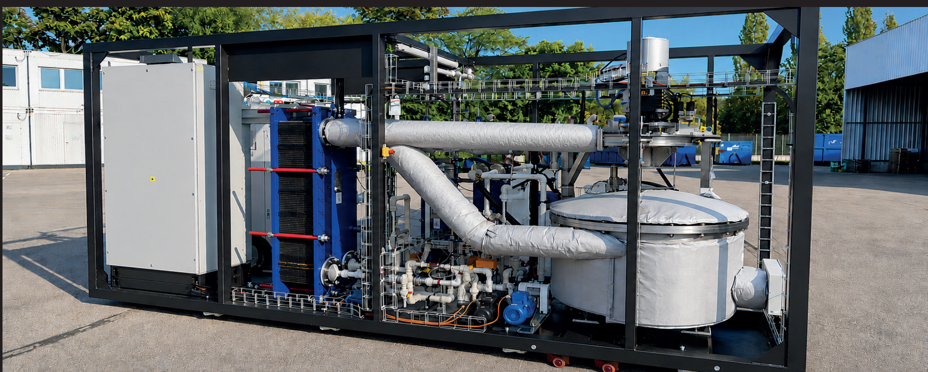
remote diagnostics and support included

Training

operator training at commissioning

Maintenance

Interval	Scope	Duration
≈ every 6 months	Routine service scope – inspection, cleaning	≈ 6 - 8 hours
once a year	Replacing lubricant cartridges	≈ 1 hour
after 2.5 years	Minor compressor maintenance – inspection, bearings	≈ 8 hours
after 5 years	Maintenance of the compressor, sensors & pumps	≈ 36 hours



Service kit

A first-year service kit is supplied with the system, covering the scheduled service at 12 months:

- Seal kit, O-ring set for shaft and casing
- Lubricant cartridge
- VFD-cabinet filter mesh
- Special tools for shaft-seal, impeller and cooling-disc service

Wear parts and lead times for later service intervals are defined in the service plan.

Consumables

Consumption depends entirely on the water and its contamination.

Many applications – for example seawater or low-fouling streams – run with little or no process chemistry: our evaporation process recovers low-conductivity distillate without continuous chemical dosing.

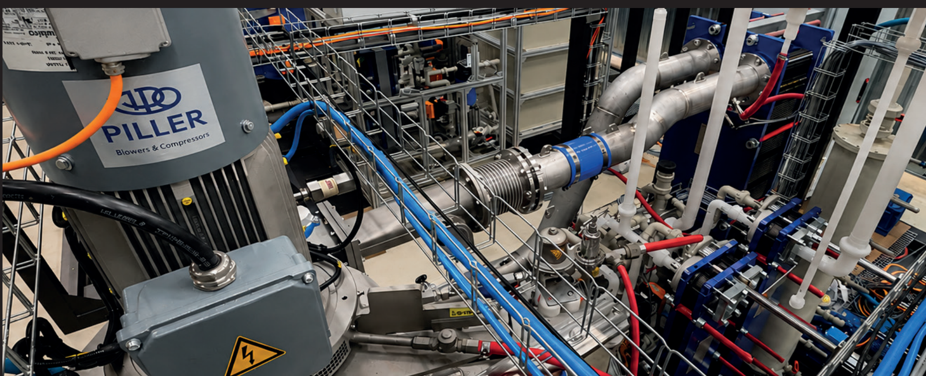
The consumables concept is defined per application, based on water analysis.

PILLER
Blowers & Compressors

Service support in India

Our service team is based in Bengaluru and handles the system: commissioning, operation support and service. The compressor is serviced by our partner and supplier Piller, who manufactures it in Pune, India – so its service and spares are handled locally.

Together, this lets us respond quickly to your service requests.



Risks and reality

These risks apply to any evaporation system. What sets the BMG approach apart is how they are engineered, tested and addressed before an offer is made.

Scaling & Fouling

What can happen
Deposits on heat-transfer surfaces cut performance and force cleaning downtime

How it is prevented
Operating window set below scaling limits; drift caught early by monitoring

Verify before an offer
Water analysis, scaling potential and concentration target

Variable feed composition

What can happen
Quality drift or shock loads change performance and energy demand

How it is prevented
Upstream equalisation and an operating window tested on real samples

Verify before an offer
Feed variability data and worst-case samples

Power interruptions

What can happen
Outages interrupt evaporation and can stop production mid-cycle

How it is prevented
Controlled PLC restart; a thermal system restarts clean, with no biological growth

Verify before an offer
Grid stability at the site and backup-power policy

Operator skill & turnover

What can happen
Knowledge loss degrades operation and maintenance quality over time

How it is prevented
Automated operation, structured training and remote support

Verify before an offer
Operator model, staffing and shift pattern

Residue logistics

What can happen

Concentrate with no authorised route off site is a compliance problem

How it is prevented

Volume reduction by design; residue concept agreed before any offer

Verify before an offer

Disposal route, cost and authorisation for the concentrate

Components & Spare parts

What can happen

A failed part idles the system while replacements ship

How it is prevented

The compressor is built and serviced in India; spares kit on site

Verify before an offer

Realistic lead times to your site and spares kit scope

A risk that is named can be engineered around.
A risk that is hidden shows up in operation.

Feasibility checklist

With these data, we can quickly assess whether the technology is worth deeper evaluation.

Flow & Operation

- [ ] Daily water volume m^3/day ....
- [ ] Average hourly flow m^3/h ....
- [ ] Peak hourly flow m^3/h ....
- [ ] Operating hours h/day ....

Water quality

- [ ] Input water analysis ....
- [ ] Main contaminants ....
- [ ] Solids content mg/l ....
- [ ] Required output quality ....

Site & Economics

- [ ] Current treatment or disposal method ....
- [ ] Current cost per m^3 ....
- [ ] Available installation space m^2 ....
- [ ] Available power supply kW; V ....
- [ ] Residue disposal route ....
- [ ] Existing RO / membrane plant on site? ....

Project

- [ ] Required timeline ....
- [ ] Decision stage eval. / budget / approval ....

If these data are available, the discussion can quickly shift from general evaluation to technical feasibility.

Start with a feasibility review

Before proposing a system, we review the application, water quality, operating model and economic assumptions.

What we review

- Flow and water quality
- Site constraints
- Energy and service assumptions
- Commercial feasibility
- Required output
- Operating model
- Residue handling

What you receive

- Initial fit assessment
- Key technical questions
- Recommended next step

Can‘t talk now?

Reach out for an online feasibility review – bring your site data and we‘ll do it from your desk.

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