ION EXCHANGE

Refreshing the Planet



From Technology to Implementation

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Indraneel Dutt

The challenge is not only treating water. It is managing change.



Variable raw water
Water quality does not stay constant

Rising energy cost
Efficiency matters more than ever

Growing reuse
Every drop must work harder

Tighter compliance
Quality expectations continue to rise

Ageing assets
Reliability cannot be taken for granted

Data without clarity
Data exists; decisions remain hard

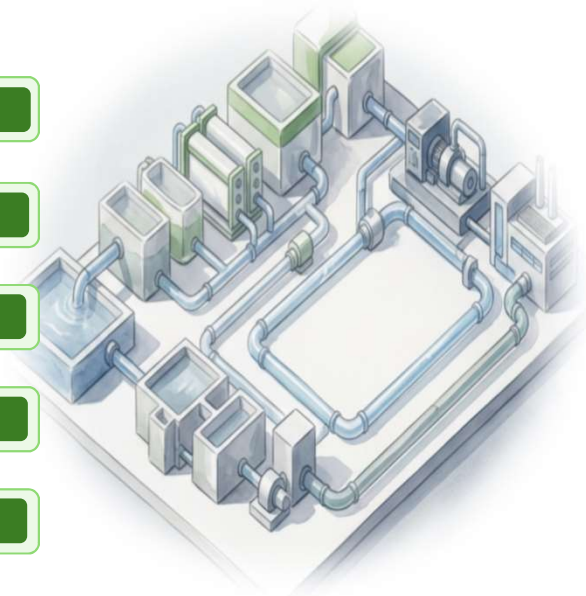
The challenge is understanding the water, process and business problem first.

Technology selection follows problem definition

WATER	PROCESS	BUSINESS	FUTURE
What is the quality — and how variable is it?	What does the plant actually need?	What are the cost, reliability & resource objectives?	How will the requirement change over time?

Technology on Paper vs Technology in the Plant

Design feed quality	Defined	v/s	**Actual feed quality**	Variable
Design flow	Expected	v/s	**Actual flow**	Changing
Design recovery	Calculated	v/s	**Actual recovery**	Moving target
Expected energy	Modelled	v/s	**Actual energy**	Observed
New equipment	Commissioned	v/s	**Actual equipment**	Real world



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Ion Exchange advantage

Breadth of technologies + ability to integrate them around the customer's water challenge.



Technology creates potential. Implementation creates value.

1 Diagnose

Water, process & business need



2 Select

Fit the right technology



3 Validate

Test risk & prove the design



4 Engineer

Integrate with the existing plant



5 Execute

Build, install & commission



6 Operate

Train people & embed routines



7 Prove

Measure performance vs baseline



8 Optimize

Learn, refine & scale



The handover from technology to plant value happens through integration, people, proof and continuous improvement

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Four things make technology implementable.



TECHNOLOGY

Does it solve the problem?

- Fit-for-purpose design
- Validated performance



INTEGRATION

Does it work with the plant?

- Existing assets
- Interfaces & constraints



PEOPLE

Can it be run reliably?

- Training & ownership
- Operating discipline



PERFORMANCE

Can the value be proven?

- Baseline & KPIs
- Measure → learn → improve

A technology succeeds only when all four work together.

From RO Concentrate to System Value

The implementation challenge is not adding OARO. It is making the whole water balance work.

01 THE PLANT PROBLEM



RO PLANT
Produces permeate, leaves a concentrated RO stream.

RO Concentrate

High TDS

02 TECHNOLOGY RESPONSE



OARO
Concentrates the RO stream further using advanced membranes.

03 SYSTEM VALUE

More water
Higher recovery



REUSE
- Process water
- Cooling water
- Other industrial uses

Less brine
Higher recovery



DISPOSAL / THERMAL DUTY
- Brine disposal route
- Thermal recovery
- Other options

IMPLEMENTATION

1 UNDERSTAND THE STREAM
- Complete ionic analysis
- TDS / temperature
- SDI, turbidity, COD/TOC, oil, oxidants

2 TEST THE RISK
- Scaling & silica
- Fouling potential
- Pretreatment adequacy

3 PROVE THE DESIGN
- Membrane projection
- Recovery & energy assessment
- Pilot where required

4 INTEGRATE THE PLANT
- Reuse specification
- Residual brine / disposal route
- Thermal duty & operating model

THE IMPLEMENTATION QUESTION: "What does this technology change in the total water balance and what must change with it?"

Turning a digital twin into a plant operating routine

Case Study 2

IONSiTE shows what implementation looks like when AI, plant data and operators are connected to a repeatable decision cycle.

THE IMPLEMENTATION JOURNEY

01 Connect

Plant data + sensors

Secure access, data quality, and agreed plant baseline

→

02 Configure

Digital twin + models

Calibrate models against real operating conditions

→

03 Embed

Operator workflow

Turn forecasts into alerts, advice and daily actions

→

04 Prove

Measure + refine

Track KPIs, validate savings, and improve the model

WHAT MAKES IT IMPLEMENTABLE

- Start with the plant's existing data and constraints
- Agree baseline, success KPIs and operator ownership
- Integrate advice into daily operating decisions
- Validate impact before scaling to more plants

CASE STUDY / FROM PILOT TO ROUTINE

Technology only becomes value when it changes the operating loop

Implementation step	What changed at the plant	Evidence of value
Data readiness	Sensors, quality data and access made usable	Trusted input
Model deployment	Twin calibrated to live plant behaviour	Near-term forecast
Workflow adoption	Operators act on alerts + recommendations	Faster decisions
Performance proof	Results measured against baseline	Savings tracked

WHERE IT SCALES

Water & wastewater | ZLD | Desalination | Industrial water

Lessons from the field

Fit technology to the process

Technology selection must align with the specific process and application — a mismatch at this stage undermines every downstream effort.

Execution determines success

Implementation, integration, people, automation and optimization are the true determinants of outcome — not the technology alone.

Scale requires measurable outcomes

Scaling demands clear technical, economic and sustainability metrics. Without them, progress cannot be verified or replicated.



Use less water. Increase reuse. Recover resources. Maximize value.

Technology creates potential.
Implementation creates value.
And sustainable value comes when the plant, the people and the process work as one.

RIGHT TECHNOLOGY › **RIGHT INTEGRATION** › **RIGHT PEOPLE** › **RIGHT DATA** › **MEASURED PERFORMANCE**

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SUSTAINABLE PLANT VALUE

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