Impactus VAP Pty Ltd

Brine Mining with Zero Waste Discharge Outcomes

Expert advisory services backed by technology-based solutions

We use brines currently being discharged, as a resource…..

... By treating them, using our technologies to…

recover fresh/irrigation quality water

Industrial salts, fertilisers, REEs, critical minerals, and precursor minerals and compounds for producing composites and value added products

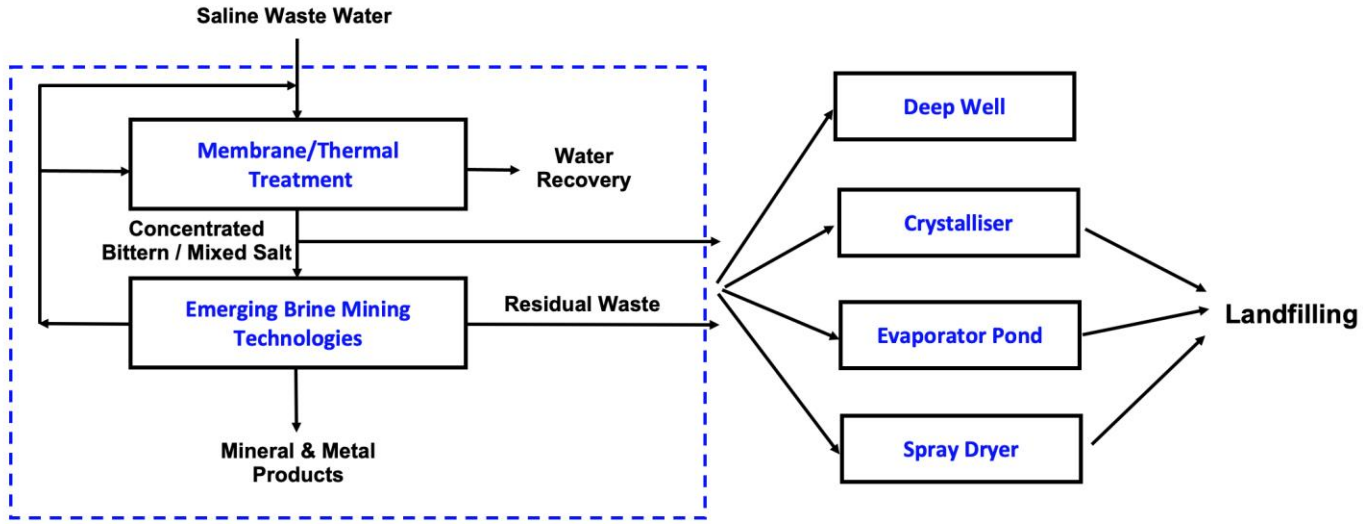
produce saleable products

and achieve zero waste discharge outcomes for reducing impacts on the environment

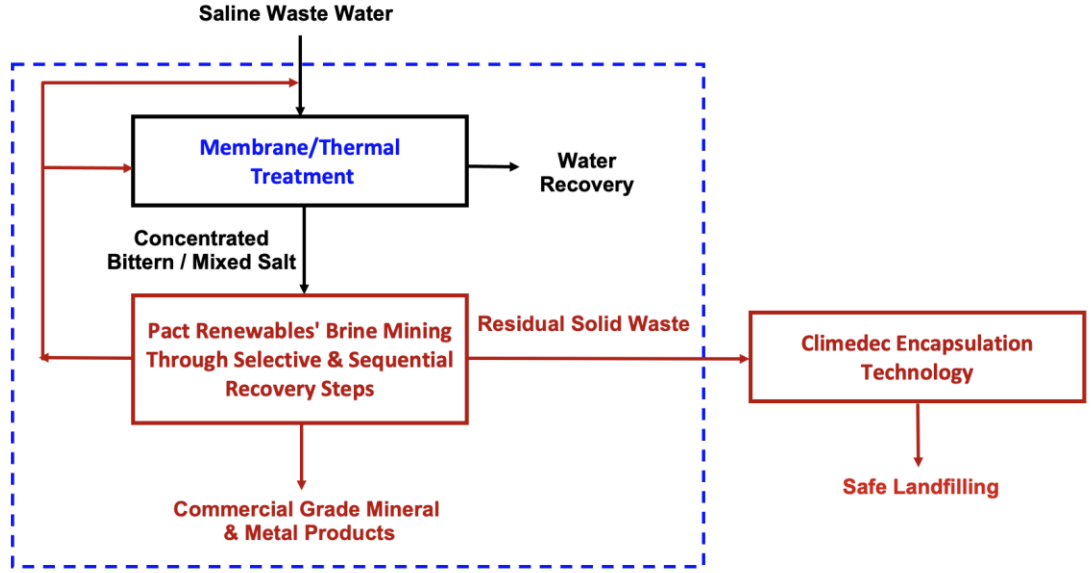
Our core strengths

- Our Zero Waste Discharge (ZWD) brine mining solutions are built on a proprietary technology platform developed and optimised over the past 40 years by Dr Aharon Arakel and his team. These technologies enable conversion of brines into one or more valuable products by using *Salpro* technology to selectively and sequentially recover commercial grade minerals, metals and compounds, leading to zero waste discharge. Where necessary, safe land disposal of residual waste is achieved using our complimentary *Climedec* encapsulation technology
- The technologies have been independently evaluated and ranked highly in terms of their technical and operational feasibility, environmental/public acceptability and economic/financial feasibility
- The naturetech products derived from compounds, generated from brines using the technology platform were recently selected by the US Forestry Service and World Economic Form for use in US 1 Trillion Trees forestation programs
- Having developed close working relationships with end-users and global product trading companies, we have in-depth knowledge of the required quality of products recovered in our processes, and their markets
- Thus, we have the ability and appropriate technical tools to dig deep into your brines as a resource and offer the best-fit solutions for recovering your target products, whilst also ensuring zero waste outcomes.

The need for sustainable management of brines is mandated by increasingly stringent environmentally-driven and health-based regulations



Conventional brine management, with or without the proposed brine mining solutions, are not sustainable according to the above mandates.



Our Zero Waste Discharge (ZWD) brine mining solutions lead to safe, permanent disposal of residual solid waste.

Saline waste generating industries that we assist

- Agriculture, forestry and land management
- Biogas generation (including anaerobic digestion systems)
- Construction (including construction and demolition landfills)
- Desalination (including seawater and inland desalination plants and types)
- Energy generation (including waste-to-energy, geothermal energy and lithium recovery from geothermal brines)
- Fertilisers and specialty chemicals (including potash and energy minerals recovery from salt lake systems)
- Food chain, from production to waste disposal (including cattle, livestock dairy and municipal solid waste landfills)
- Mining and mineral processing (including active and inactive tailing storage facilities, acid mine drainage and site rehabilitation projects)
- Municipal and industrial water and wastewater
- Oil and gas (including flowback impoundments associated with shale gas operations and residual salt storage ponds in coal seam gas production)
- Paper/cardboard manufacturing
- Petrochemical/metallurgical facilities

Our Brine Mining Solutions offer several benefits across multiple industry sectors

- Ability to recover mineral products while achieving zero liquid discharge
- Ability to recover additional water for reuse
- Sustainable and substantially improved economics when compared with conventional brine mining and volume reduction technologies
- Flexibility in the arrangement of process components and product options to establish our treatment facilities as end-of-pipeline solutions, all in one platform configuration
- Unique technology-based solutions for brine mining, evident through whole lifecycle assessments for compliance with corporate compliance with ESG
- Satisfies changing regulatory requirements and stakeholders' expectations

About us

Impactus VAP Pty Ltd, the consulting arm of Sydney, Australia based Pact Renewables Pty Ltd, provides specialist advisory services, based on technology solutions for saline waste management and brine mining.

Both companies are directed by *Dr Aharon Arakel*, a pioneer and global expert on the recovery of values from saline waters and wastewaters, with his first patent on production of minerals from salt lake brines dating back over 30 years.

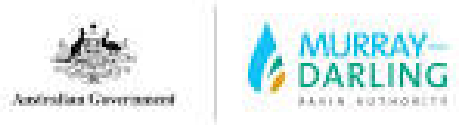
Aharon has assisted many major companies in desalination, mining, energy and food and fertiliser production sectors around the globe with their saline waste disposal challenges. He has advised governments in Australia, China and USA on matters related to sustainable management of saline wastewaters and has licensed his patented technologies to entities in Middle East, Japan, USA and Australia.

Our project delivery team is comprised of experts from around the globe, highly experienced in delivery of technology-based solutions, from concept to large-scale piloting and demonstration projects. The Company uses specialised in-house testing facilities as well as external laboratories for its projects.

Snapshots of our technology optimisation efforts

Closeup views of test rig-scale production of media as a feedstock for encapsulation processes. The feedstock and encapsulated products have been and continue to be subjected to comprehensive field and laboratory-based performance evaluations.

Some of the organisations assisted by Dr. Arakel and his team



Services we provide

Desktop studies including prefeasibility and feasibility studies. As a supplier of both technology and sustainable saline waste solutions we are uniquely placed to undertake integrated lifecycle assessments (LCA) and techno-economic assessments (TEA) on behalf of our clients. We also undertake independent document reviews and recommendations to facilitate transition of companies' projects, from pilot to commercial production. Beyond desktop studies, process optimisation through piloting and follow up services relating to full-scale plant establishment and operation are handled directly by Pact Renewables.

Contract R&D for generation of site-specific IP, to be owned by the client, which may include:

- Development and testworks for process and product optimisation
- Comprehensive lifecycle and techno-economic assessments of products and processes for recovery of values from clients' residual waste streams as a resource
- Development and optimisation of a Technology Applicability Envelope (TAE) from generated R&D outcomes. A TAE is a compilation of information related to various aspects of a technology portfolio, products and services that have reached market readiness and their performance verified through integrated LCA and TEA, for commercial application for sustainable brine management.

Advice to brine mining solution providers on options for safe landfilling of residuals from their processes and QC/QA aspects of their mineral products.

For more information on our services, please visit our website.

Impactus VAP and your brine mining requirements

Contact details for obtaining additional information and confidential expert advice:

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