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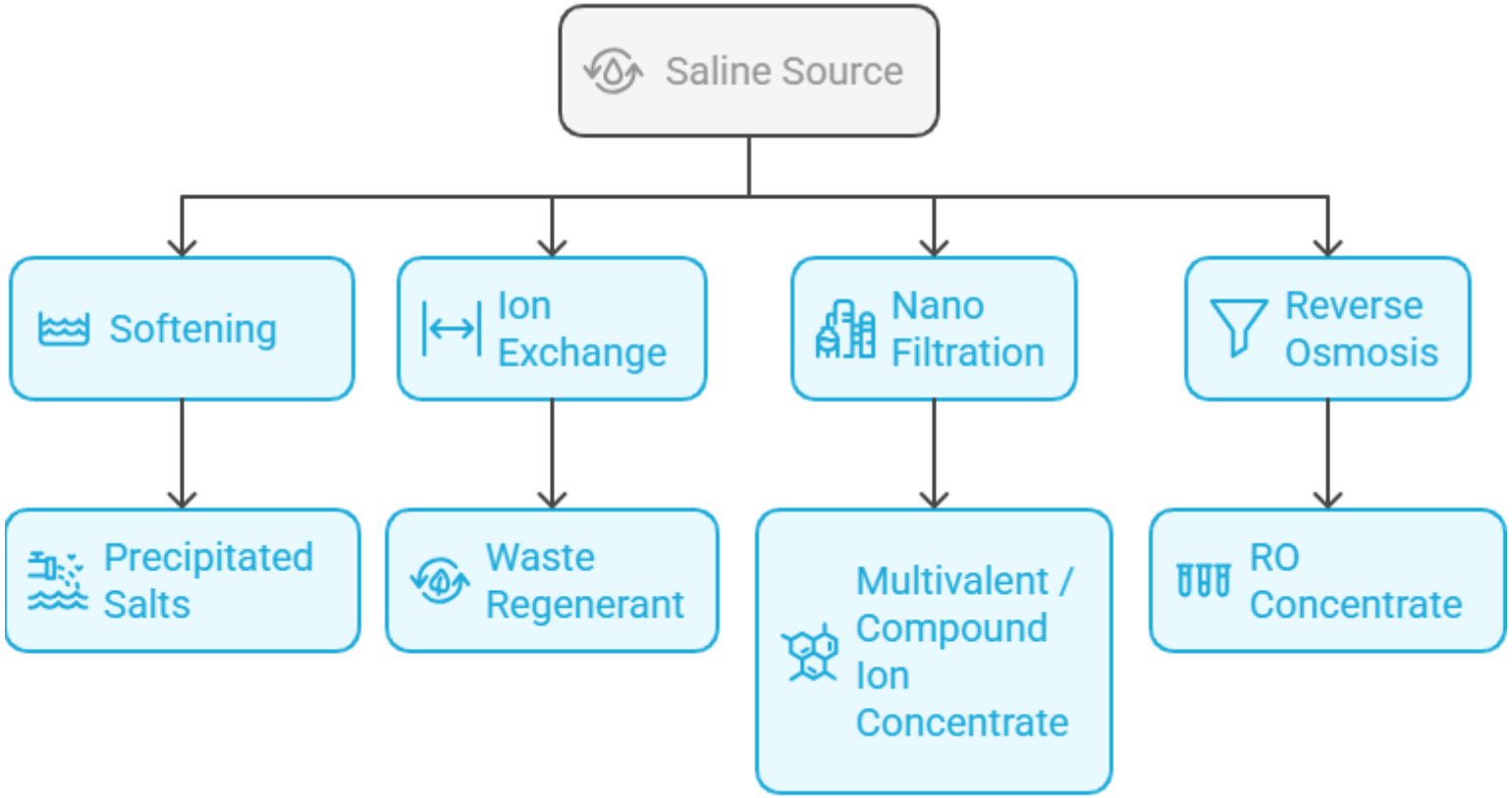
Christchurch Ōtautahi
29 September - 3 October 2025

Beca HunterH2O

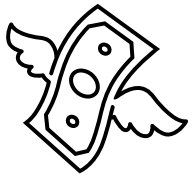
Brine – seeking a single solution is not necessarily the best approach?

Brendan Dagg

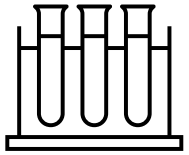
What is Brine?



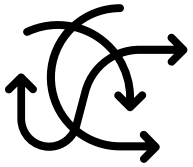
Why is Brine important?



Expensive if not integrated into planning

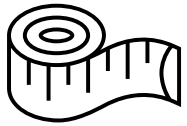


Difficult chemistry to balance



Integral to future high-end water uses

Management prevents legacy enviro issues



No one size fits all approach

United Nations SDGs 6, 7, 11, 12

How do we Manage Brine?

How about this?

Belmont Desalination Plant June 2025

What do we do if we are not located right next to the Ocean?

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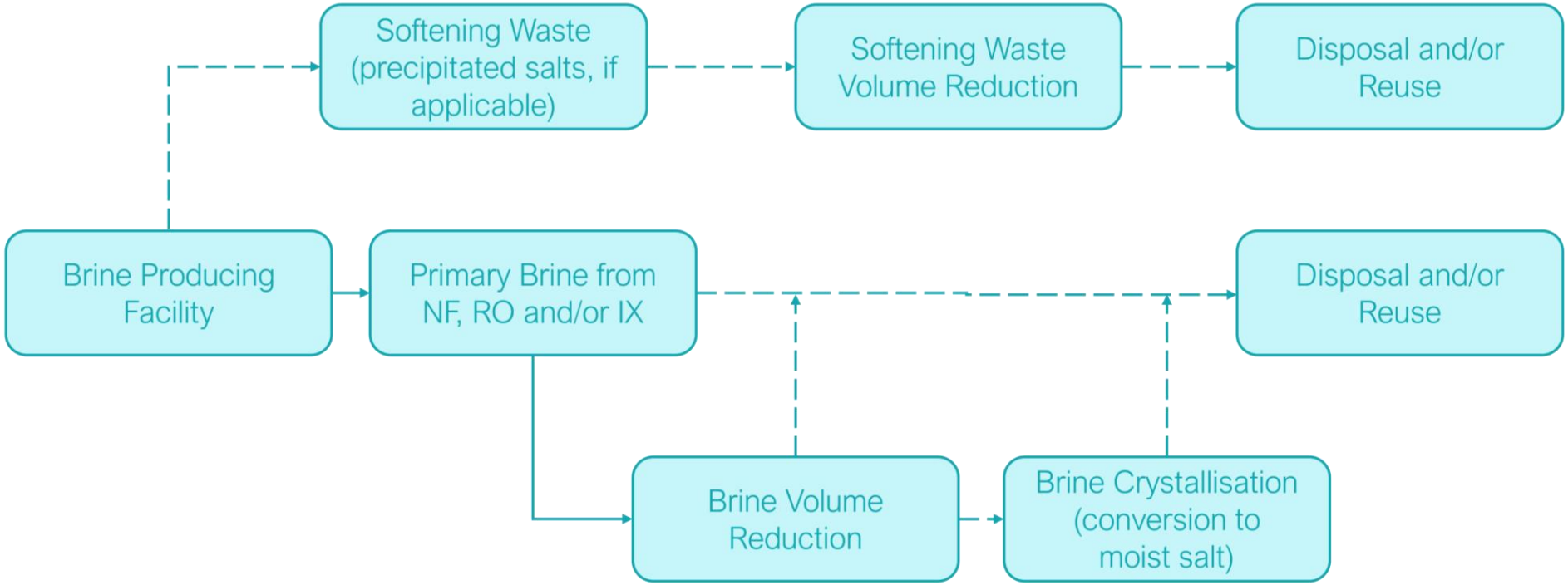
How do we Manage Brine?



Approaches to Brine Management

It is important to adopt an understanding that brine management is likely to include **several different approaches** all working in parallel, with the overall approach optimised for location-specific constraints and opportunities.

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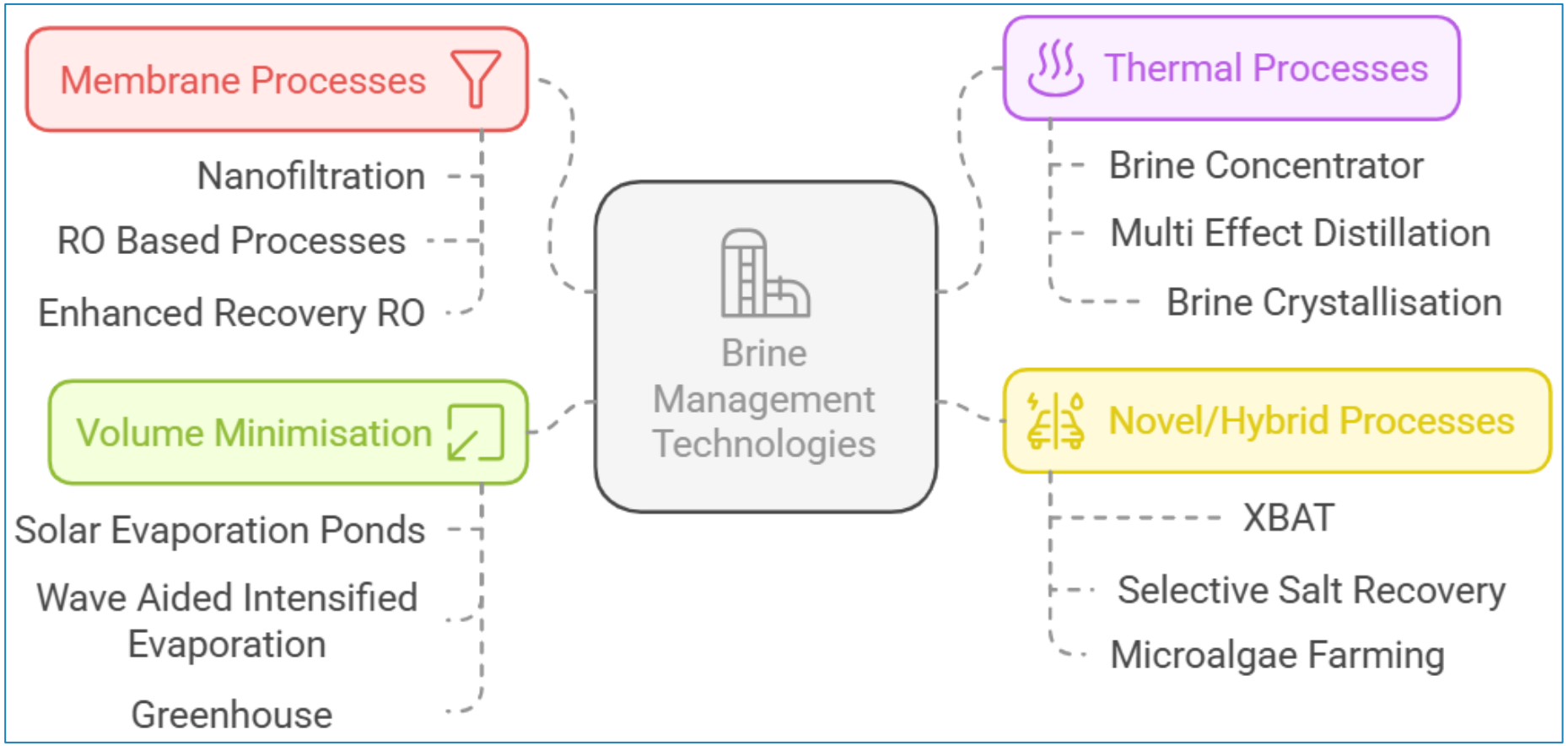
5 Key Steps

1. Establish Water Composition, Potential Recoverable Components, and Projected Brine Quality
2. Identifying Disposal and Beneficial Use Routes
3. Brine Treatment / Minimisation Technologies
4. Determine Treatment Methods and Sizing / Capacity
5. Evaluate Holistically to Determine Preferred Approach

Brine Treatment / Minimisation Technologies



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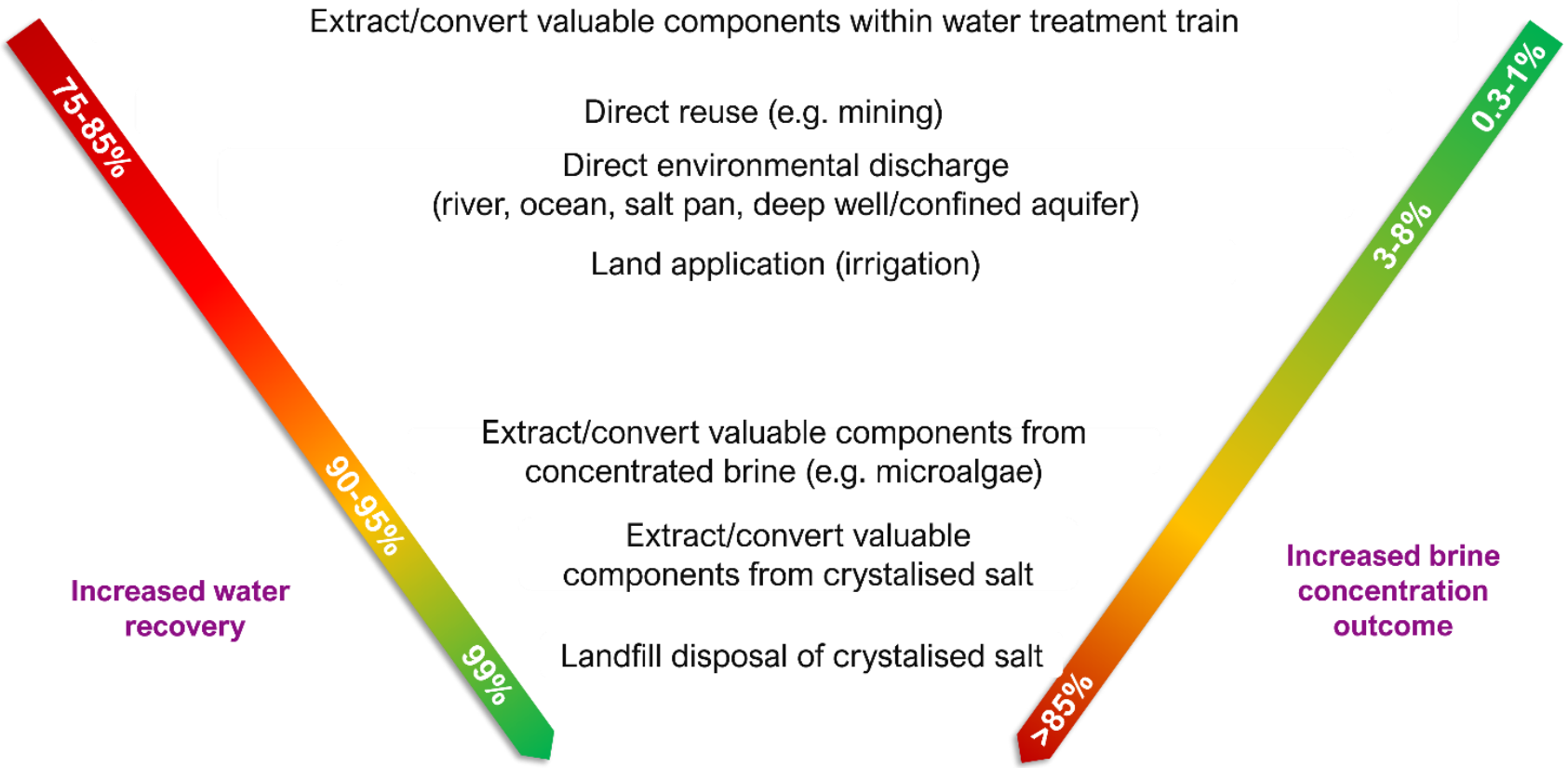
Options Funnel



Case Study 1 – Inland PRW

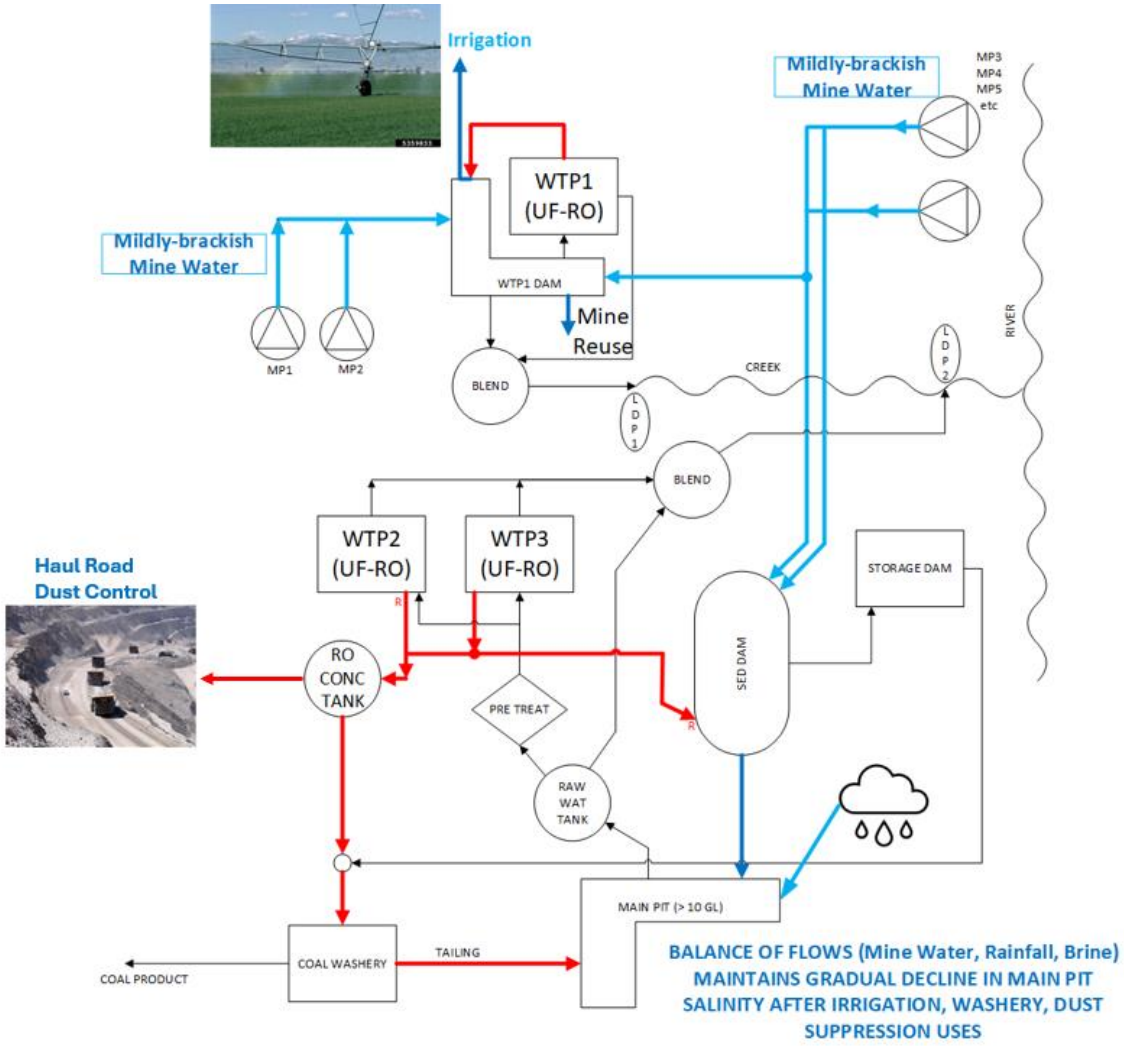
PRW
Brine

Objective: account for brine management early in the PRW development to prevent it being a showstopper

Key Aspect: Location is not feasible for solar evaporation ponds even though the 'headline' pan evaporation rate is higher than average rainfall

Outcome: Brine will be managed through a mix of river discharge with WW effluent, irrigation to woodland, potential biosolids supplement and landfill following concentration and crystallisation.

Case Study 2 – Inland Mining



Objective: reduce stored water from 12 GL to 2 GL and reduce salinity to assist with end of life

Key Aspect: Managing brine produced, modelling undertaken to assess rainfall, raw mine water extraction, washery consumption, dust control, irrigation and evaporation

Outcome: Brine is managed through a mix of blending back to source water; raw water salinity impact is compensated by rainfall runoff and low salinity mine water source, with direct reuse on site

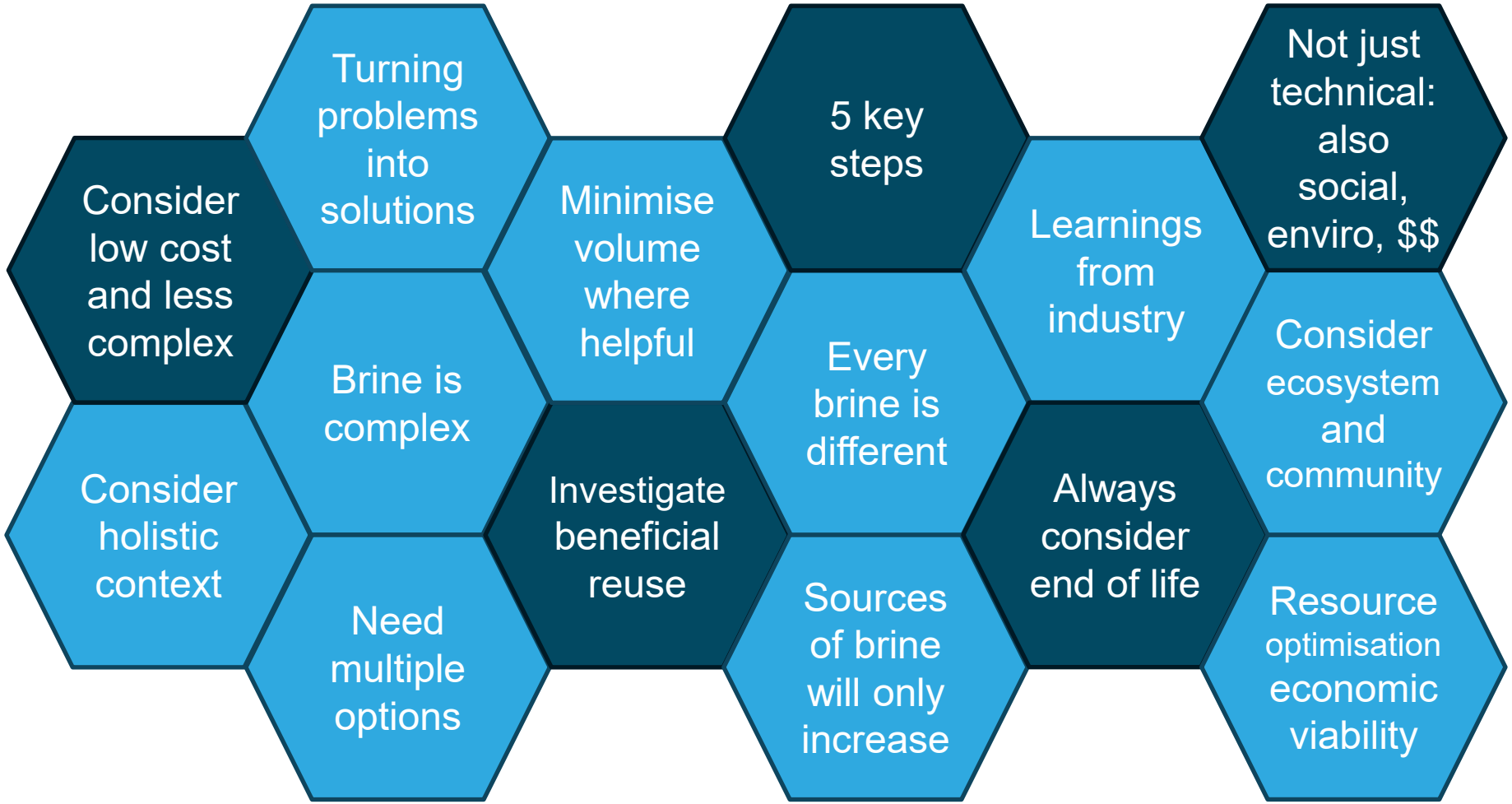
Findings from Studies

Approach	Key features	Issues
Ocean outfall	• Low cost, Proximity to coast	• Potential enviro impact
River discharge	• Low cost, Proximity to river	• Potential for enviro impact
Irrigation	• Large area, soil, plant specific, pipework	• Land and irrigation system cost and neutralisation. • Maintenance, enviro risk of leak, groundwater • Seasonal storage needs
Confined aquifer injection	• Disposal to similar or poorer groundwater quality • Requires aquifer to be confined	• Finite storage, pipeline cost, maintenance, high pressure and power needs. Concentration required to minimise volume
Landfill	• Special purpose landfill to isolate saline waste from general waste.	• Multiple confinement layers, leak detection required • Ongoing management of landfill is a legacy • Concentration and crystallisation required to minimise volume

Findings from Studies

Approach	Key features	Issues
Direct reuse	• In isolated cases, nearby mines or industry may be able to use the brine directly as a water substitute.	• Pipeline easement and maintenance • Environmental impact if leaks. • Lack of surety for user consumption
Selective salt (or other component) recovery	• Separates the brine into components for re-use or sale	• Product(s) purity and cost versus alternative bulk commodity sources • Needs users close by to minimise freight. • Process complexity; Emerging technology • Very expensive, regret capital risk
Microalgae brine consumption	• Beneficial algal byproducts • Requires multiple passes to consume the brine	• Requires brine to be at least 2.5% salt • Significant land requirement • Emerging technology – not fully understood
Softening waste component	• May be able to dispose with biosolids	• Proximity to biosolids generation
Dispose with sewer discharge	• Dilution with treated effluent	• River, land or ocean ultimate discharge • Potential for environmental impact

Conclusions



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Thanks / Contact Us

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Questions? Patai?