



# Water - Naturally

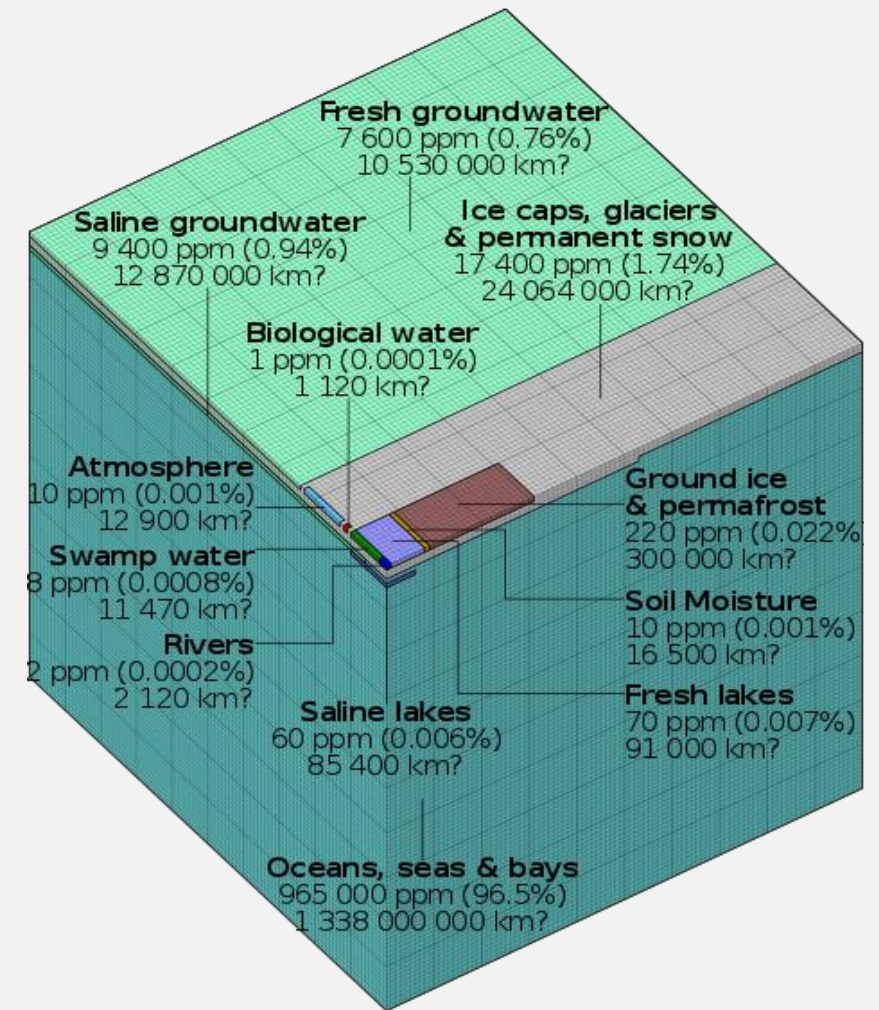
## Reed Beds Technology for Water Treatment - Overview

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# Wastewater – Age Old Problem

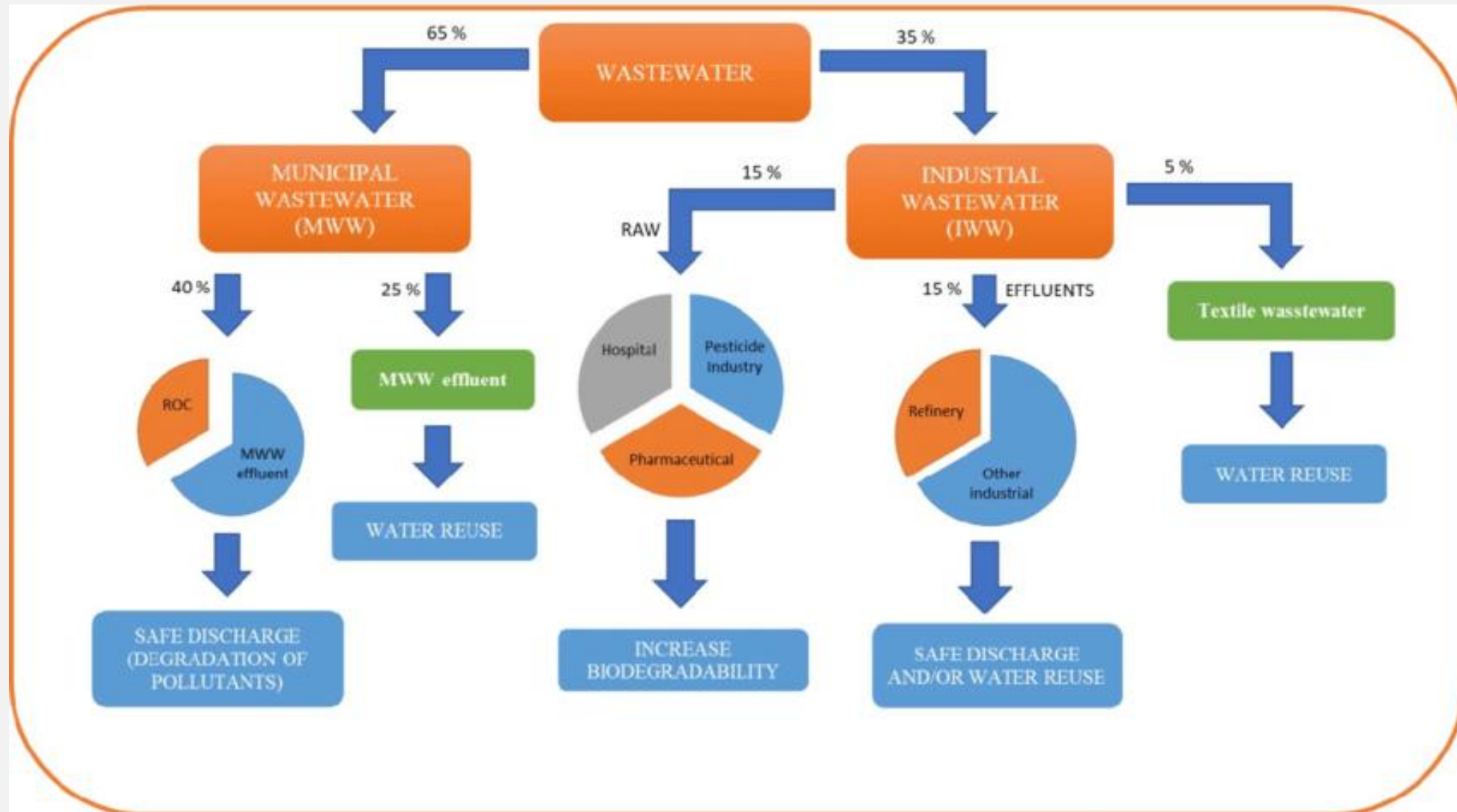
- Water is life, water is local. These are the two most important facts about water.
- Wastewater results from Human activities and it is as old as the first civilization.
- Wastewater has many types and sources; from Domestic to agriculture to industrial.
- Globally the majority of Wastewater is discharged and disposed without treatment leading to further water pollution.
- Wastewater Treatment varies depending on the type of contaminants/waste.
- Considering that freshwater in rivers and lakes constitute less than 0.01% of the available, it is astonishing to see that most of the wastewater is dumped into rivers and lakes without treatment.



Source: [https://commons.wikimedia.org/wiki/File:Earth\\_water\\_distribution.svg](https://commons.wikimedia.org/wiki/File:Earth_water_distribution.svg)

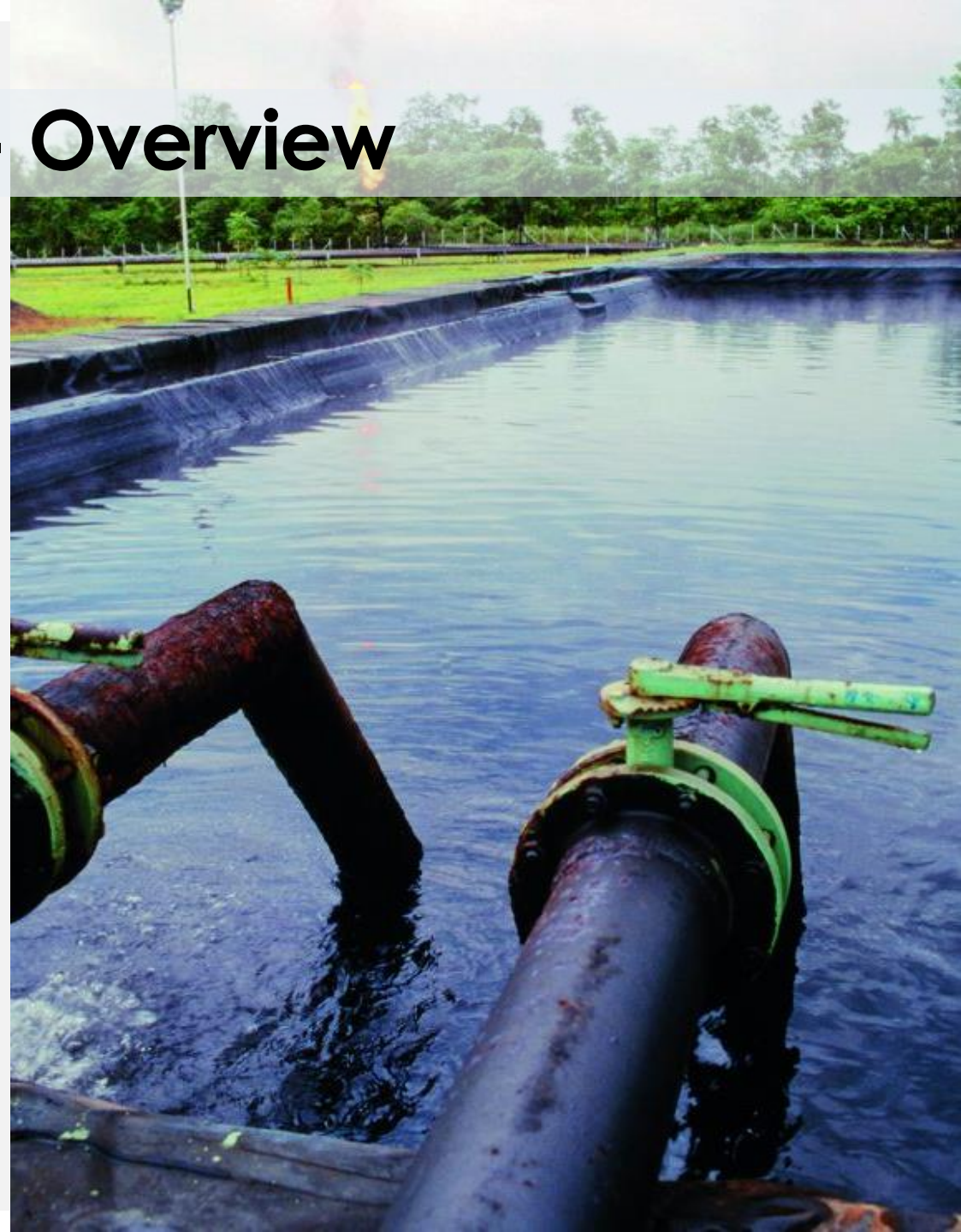


# Type of Wastewater – Overview



# Value and Customer Review - Overview

- Oil and gas exploration and production (E&P) activities generate a variety of waste materials requiring management.
- These waste materials include produced waters, spent drilling fluids, used drilling muds and drill cuttings.
- Produced water is the largest wastewater source by volume generated during oil and gas extraction.
- The ratio of produced water to hydrocarbon recovered in oil and gas extraction in the U.S. can vary greatly across different formations. For example, stakeholders reported ratios of produced water to oil ranging from less than 1:1 to more than 100:1.
- Over time, the characteristics and volume of produced water generated for a well can change. In addition, periodic well maintenance and stimulation activities can affect produced water characteristics and generation rates.





# Reedbeds in Action

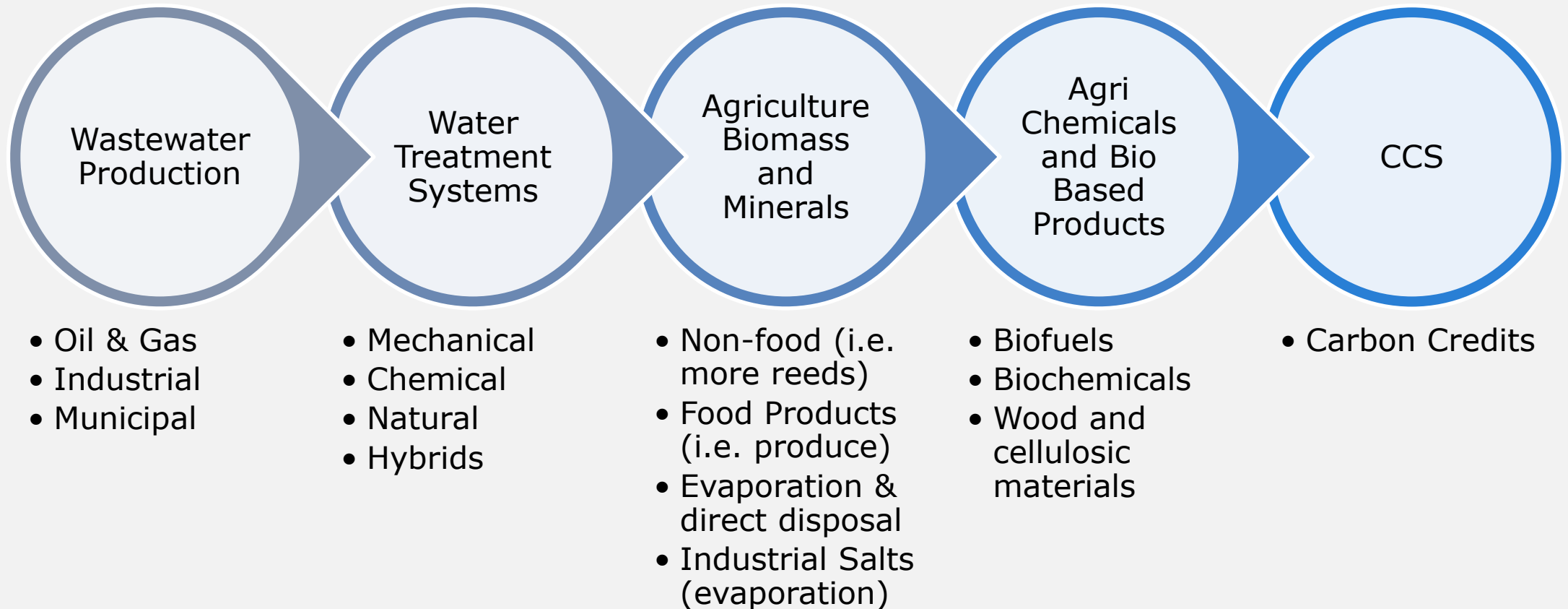
- As an example of the versatility of Natural solutions for produced water, the Nimr Water Treatment Plant in Oman is the largest and the only facility in the world.
- Widely acknowledged as one of the most innovative environmentally friendly treatment plants in the international oil and gas sector.
- The NWTP has been instrumental in reducing the amount of produced water that is disposed to the deep well aquifers. The facility is gravity-based, with close to zero energy demand for the water treatment processes and minimal fossil fuel consumption for its operation. This translates into enormous cost and resources savings and significant greenhouse gas emissions reduction (>99%) compared to pumping into deep aquifers.
- The result of this project is a significant reduction in the Nimr oilfield's environmental footprint, and the NWTP alone contributes around 4.3% to Oman's overall Intended Nationally Determined Contributions to reduce greenhouse gas emissions by 2%.



# Making Money Making Good

- The economics of Constructed Wetland treatment facilities are hugely dependent on several important factors such as:
  - Type and volumes of wastewater to be treated;
  - Location and cost of Land/Labor and Material;
  - Value of end products (i.e. agrichemical products, biofuels, simple agri-products, industrial salts, etc.)
  - Carbon Offset schemes' maturity
- The most lucrative returns are generated from:
  - CAPEX / OPEX savings compared to traditional water treatment facilities; and
  - Value of produced Products (see above)
- Running several scenarios, it was evident that the most profitable, efficient and deployable solutions were in the Oil & gas industry and the Municipal waste treatment. In both sectors, the benefits and the profits far exceeded any alternative methodology for water and affluent treatment.

# Value Chain and Main elements



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Main Commercial and intrinsic elements	
Cost (UTC)	Low
Profitability	Commercial
Sustainability	Sustainable
Expandability	Expandable
Environmental	Positive
Employment	Agriculture / Industrial
Resources' Utilization	Water And Biomass
Energy	Positive
Co2	CO2 Credit
Impact On Economy	Positive



# Why Now – What's New

## Making the Point: Why it Will Work

- For Biological Wastewater Treatment, the four essential elements of success are brought together: Need, Profitability, Shared Value and Commercial Innovation. This is led by a core team of developers who have instrumental role in developing this technology and unique commercial and financial skills capable of delivering a hard to replicate product.
- Value created by is captured by Innovative Commercial Structures to realize Shared Value for all stakeholders.
  - Bespoke process design combined with delivery excellence is believed to create a new market segment.
  - Flexibility through design means that each facility can “fit the right market, at the right time, for the right cost”. The amounts of different products can be changed to meet local and international demands.
  - Most competitive processing fee of any comparable mix of technologies over the lifetime of the treatment facility.

## How Come Nobody Thought about This!

- None of the technology elements are new.
  - Constructed wetland, Reedbeds and saline agriculture utilizing effluent waters have been around for decades and each step of the process is developed and matured.
  - Possible new technologies will add to the optimization of the process to further reduce cost.
  - It has been implemented and hailed as one of the most innovative groundbreaking projects (see earlier review about Oman Facility). The missing ingredients are a full understanding of each of the elements of the Value Chain (i.e. oil production to wastewater management). Not too many experts are around, WE&B have them!

# Summary

- Unique Management Team with complementary skills capable of delivering a hard to replicate Concept and Project development.
- Integrated solutions will lead to the creation of IP.
- Unique process design combined with Sustainable Profitability are believed to create a new market segment.
- Proven Concept and well-known examples of commercial operations.
- Flexibility through design means that WE&B designs and solutions can “fit the right market, at the right time, for the right cost”.
- Growing interests in financing such projects and ease of working with local talents to implement means higher returns on investment ethically and sustainably.
- Most competitive processing fee of any comparable process.

The background features a dark, textured surface with numerous glowing blue water droplets of various sizes. Scattered across the lower right and bottom areas are several faint, white-outlined icons of chemical structures, each enclosed within a teardrop-shaped border. The overall aesthetic is scientific and modern.

THANK YOU