

# PDO's Latest Utilization Opportunities of PW

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شركة تنمية نفط عُمان  
Petroleum Development Oman



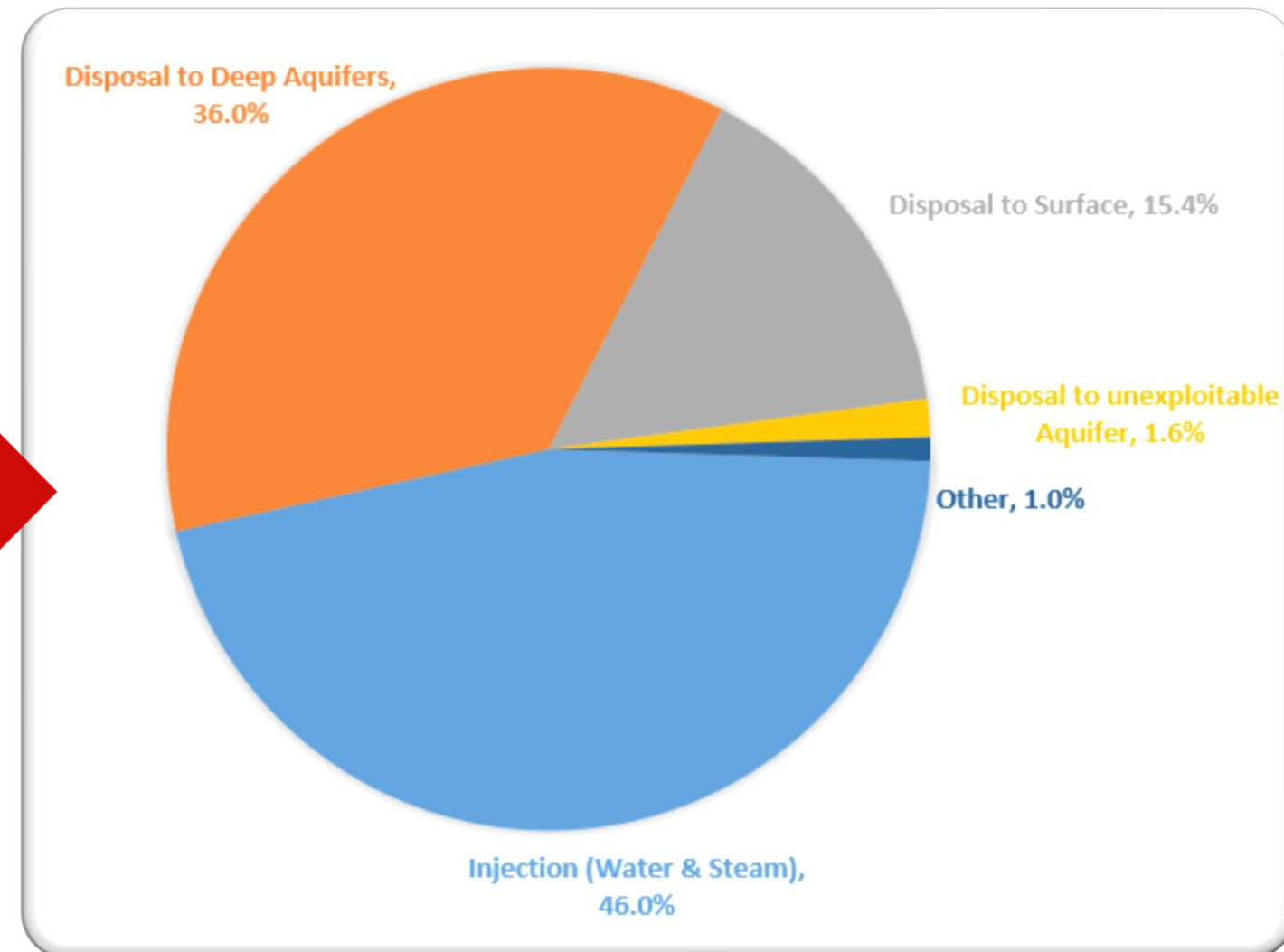
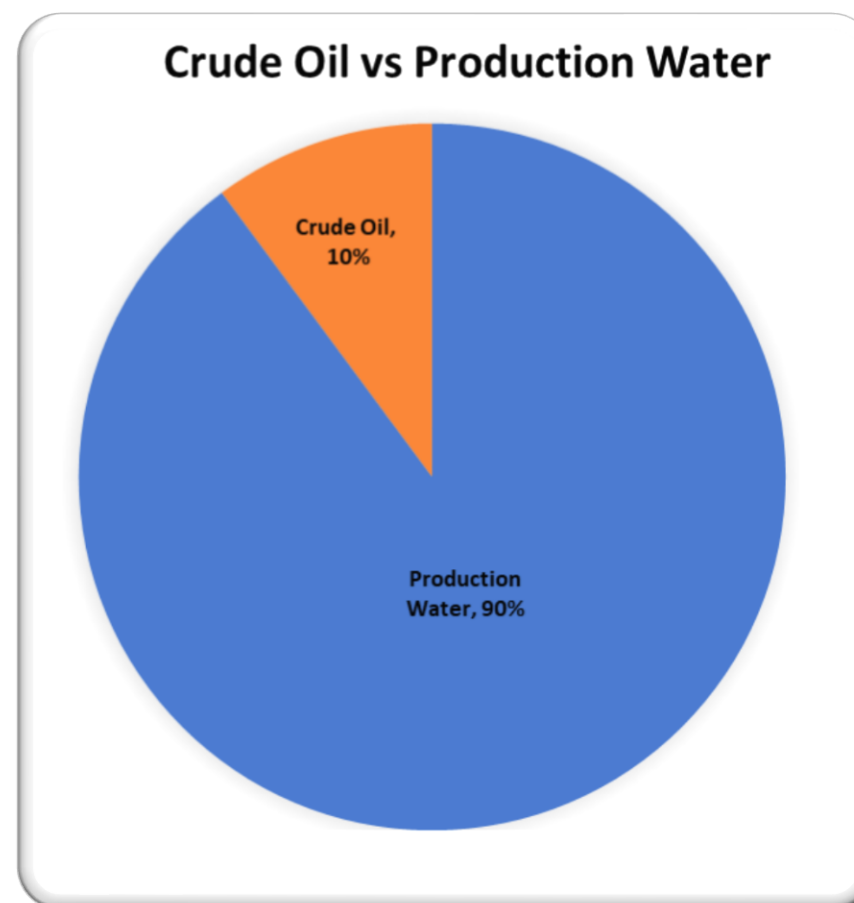
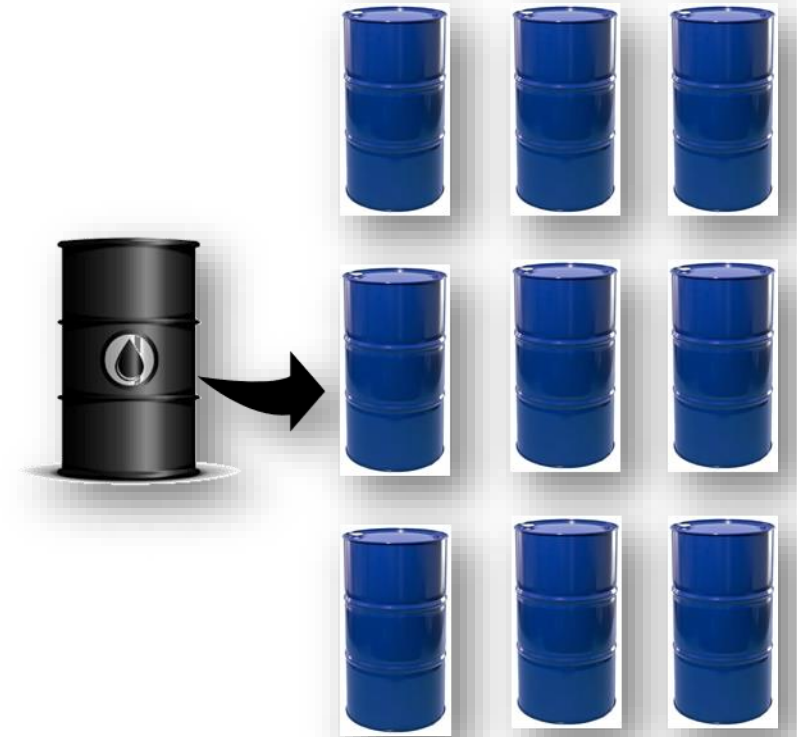
# Outline

- Produced Water Overview
- PDO Strategy for PW Management
- Opportunity Maturation Process
- Implemented Solutions
- Piloted Technologies
- Opportunities



# Overview of Produced Water Management

- ✓ For each barrel of Oil there are 9 barrels of produced water
- ✓ Oil Fields produced water cut  $> 90\%$



# PDO Strategy

## **REDUCE**

- Reduce water produced to surface
- Reduce deep water disposal (DWD)
- Reduce aquifer abstraction:
- Reduce shallow water disposal: Eliminate disposal to shallow exploitable aquifer.

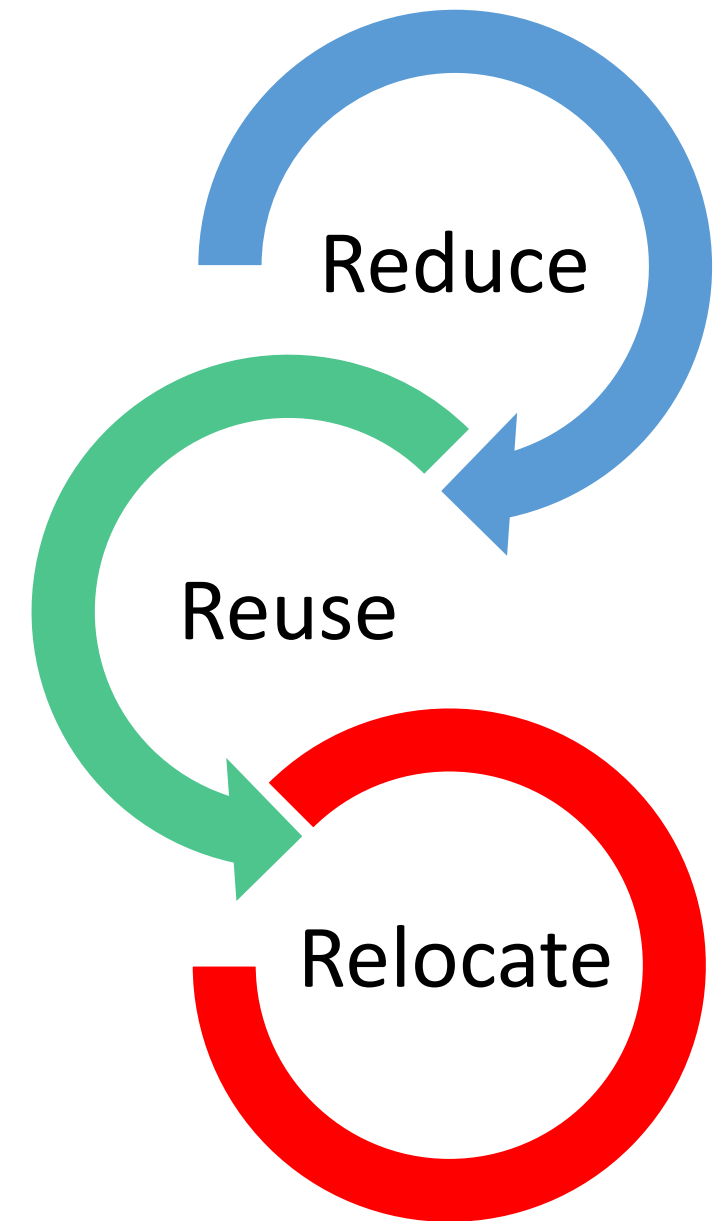
## **RE-USE**

Re-use produced water for beneficial purposes such as:

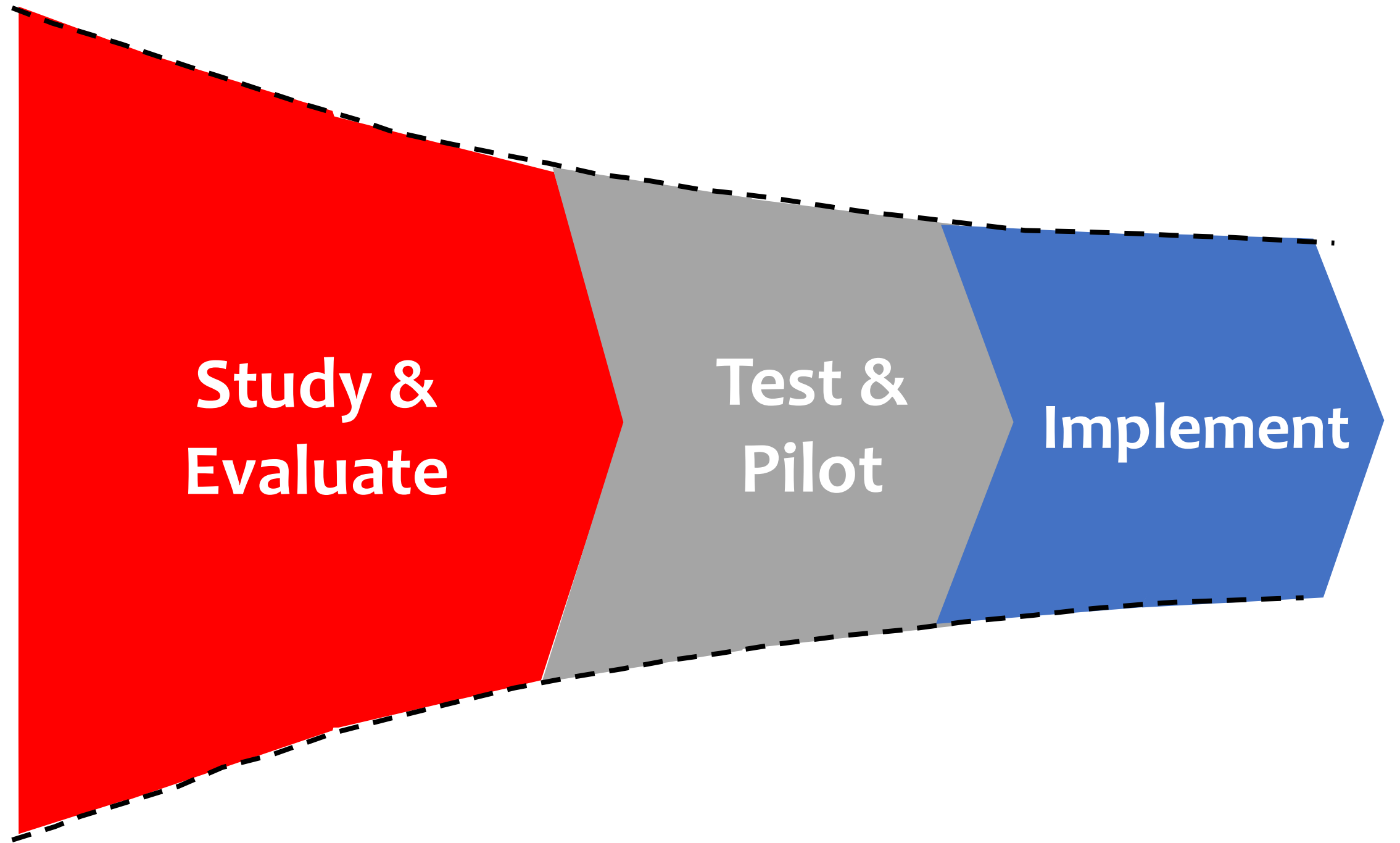
- Water injection,
- Steam generation/Injection,
- Salt Making and wetlands.

## **RELOCATE**

- Relocate produced water from areas with excess water to areas with shortage in water e.g., Yibal to Lekhwair pipeline.



**Opportunity  
Maturation  
Process**



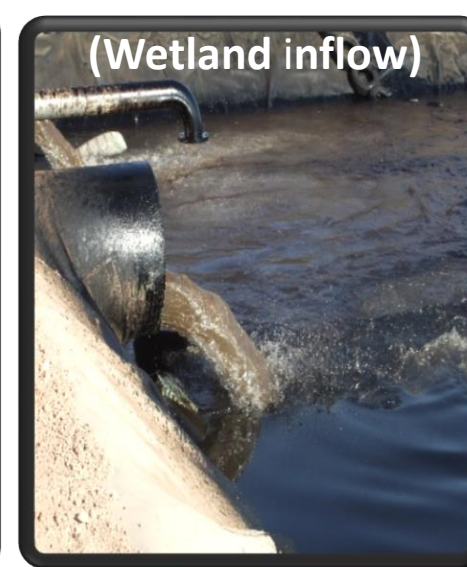
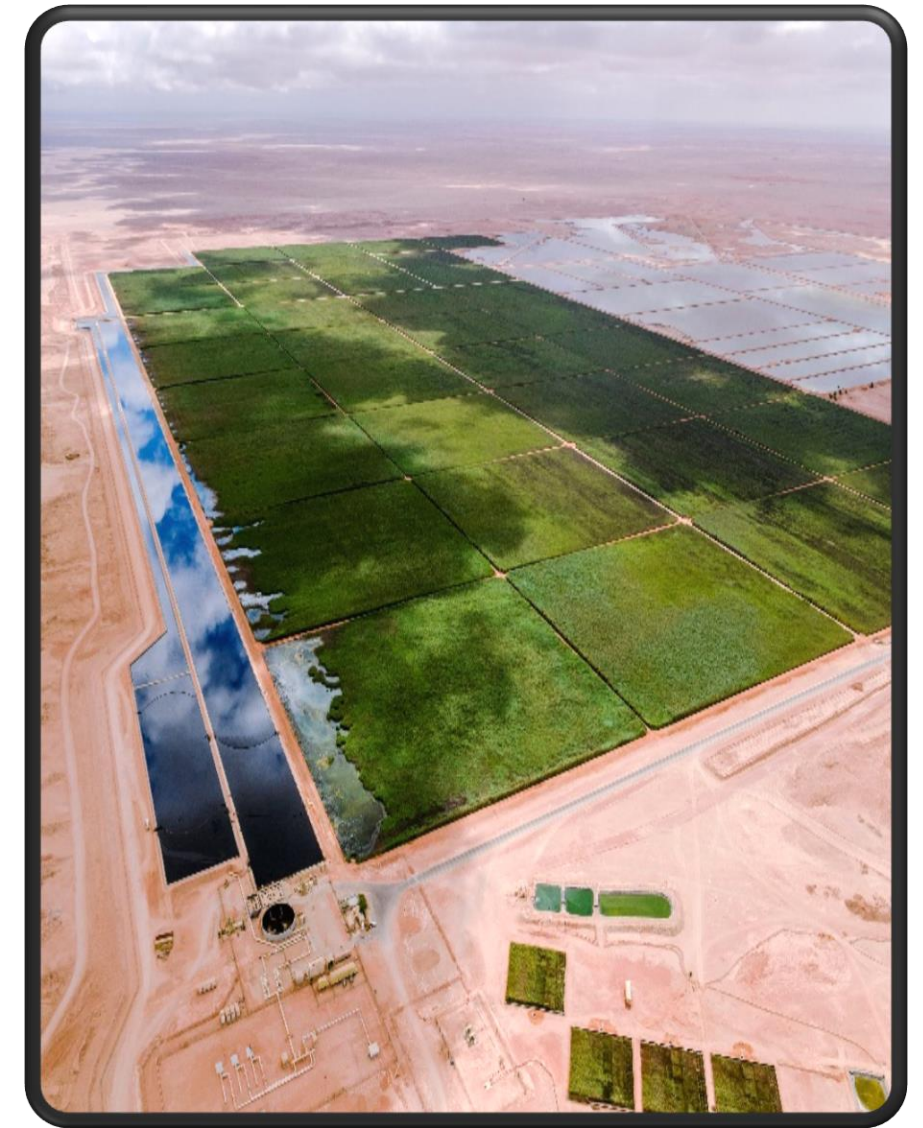


# Implemented Solutions

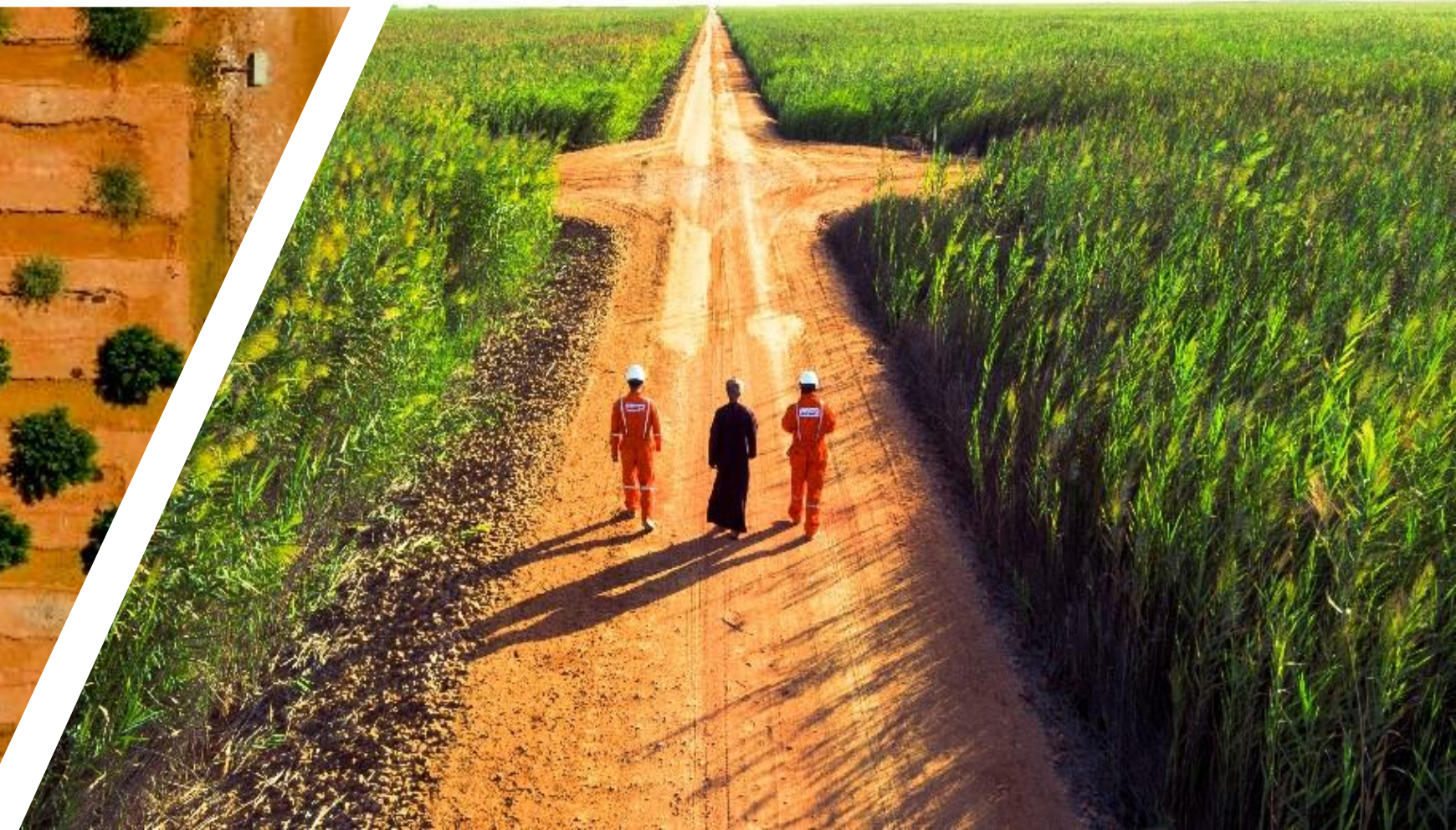
## Reed Beds

### Reed Beds

- Carbon Credit
- Greening the Desert
- Power Saving
- Removing hydrocarbon from PW
- Using treated water for Bio-saline Irrigation and Drilling





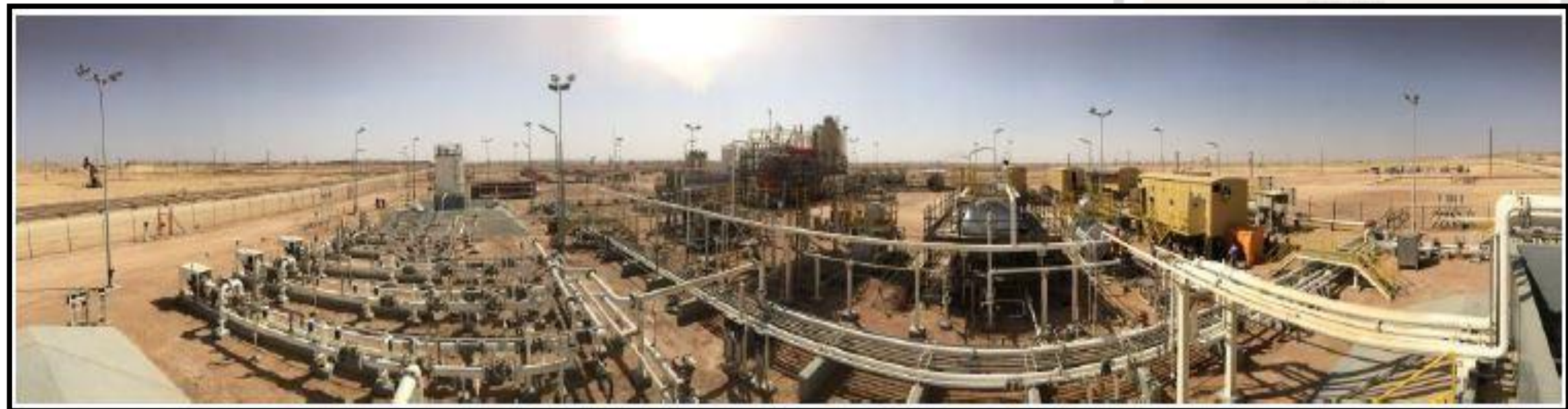
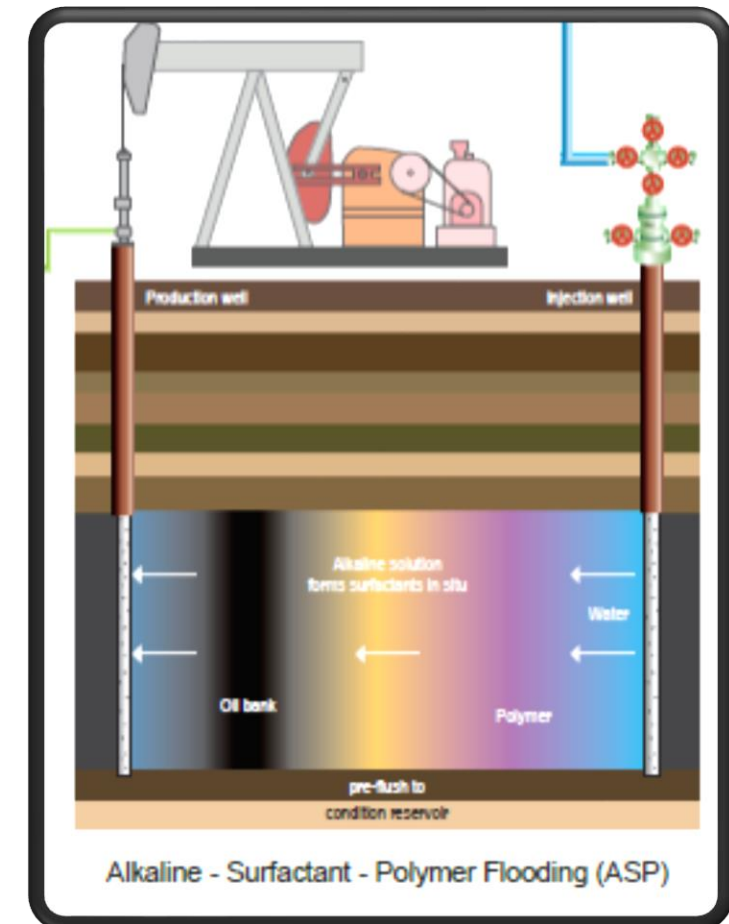




# Implemented Solutions cEOR

Using produced water for Polymer and ASP flood

- Eliminate Aquifer abstraction
- Comply with PDO strategy (Reduce & Reuse)

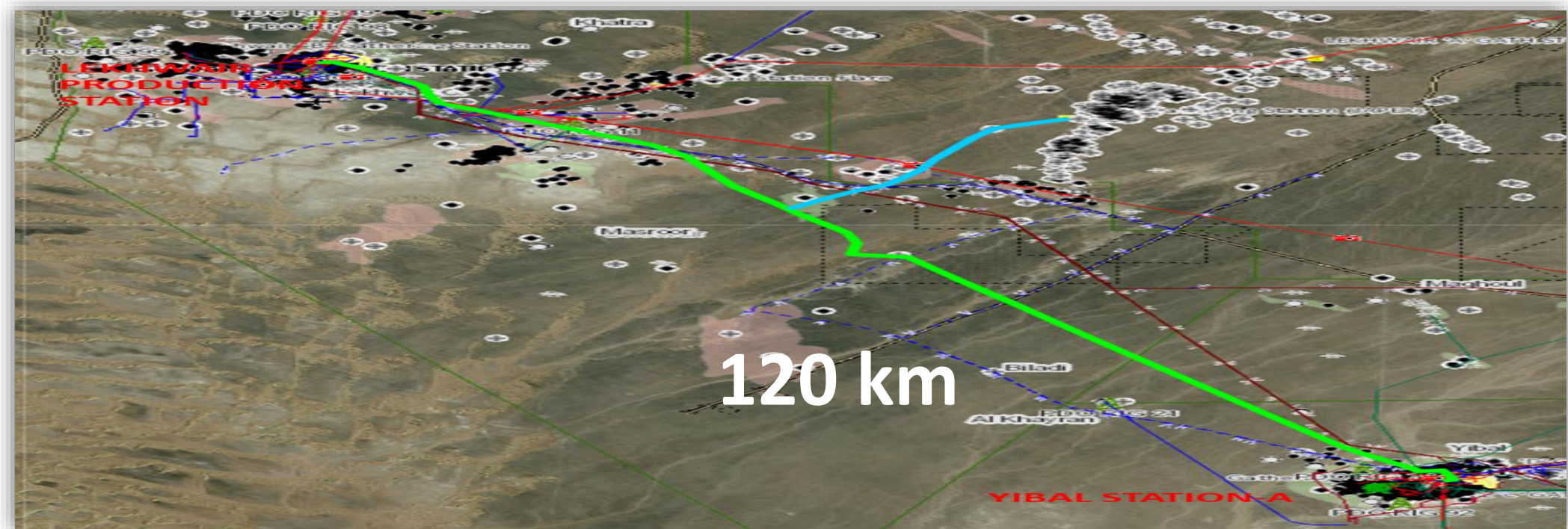




# Implemented Solutions Relocation

Relocating produced water from one field to another

- Comply with PDO strategy (Reduce & Reuse)
- Reduce aquifer abstraction
- Reduce treatment cost (CAPEX & OPEX)
- Saving Power from DWD pumps





# Piloted Technologies

## Bricks

- Development of Compressed Stabilized Soil Block using Produced Water from PDO Oil Fields
- Unique interlocking blocks – less quantity of cement required
- Replace traditional bricks for construction of pavement, lining of walls/bunds and warehouses



## Bio Saline Algae

- Cultivation of algae in PW that is contaminated with hydrocarbon





# Opportunities

## Salt Production

- Produce salts and minerals from produced water

## Fracking Fluid

- Using treated produced water for fracking activities instead of aquifer water

## Ecomister Evaporators

- Reduce evaporation ponds footprint
- Increase evaporation rate

## Soda Ash

- Soda ash production from captured CO<sub>2</sub> and salts from produced water





Thank

You

