

MOBILE WATER DESALINATION SYSTEM USING REVERSE OSMOSIS POWERED BY SOLAR ENERGY.



KFUPM Design Expo

1. ELEVATOR PITCH

Imagine a rural area where people have their own clean drinking water system. Our team in this project aims to develop a mobile solar-powered desalination system that improves access to clean drinking water in remote areas. The system will be an affordable, reliable, and eco-friendly solution for clean water production through salty underground water. This project is expected to improve the socioeconomic of the population in rural and remote areas.

2. OBJECTIVE

To design and develop a mobile water desalination system that utilizes reverse osmosis technology and is powered by solar panels. The system should be capable of efficiently converting saltwater into clean, potable water in remote or off-grid locations. This project aims to provide a sustainable solution for addressing water scarcity by leveraging renewable energy sources and advanced water purification techniques.

3. PROBLEM STATEMENT

Clean water scarcity is common in remote areas of Saudi Arabia where drinkable water sources are limited. This scarcity in particular negatively impacts the population in small villages and camel owners. The current mode of water supply is via a water tanker from plants to remote areas. The project aims to solve the problem of clean water scarcity by developing a mobile clean water unit.

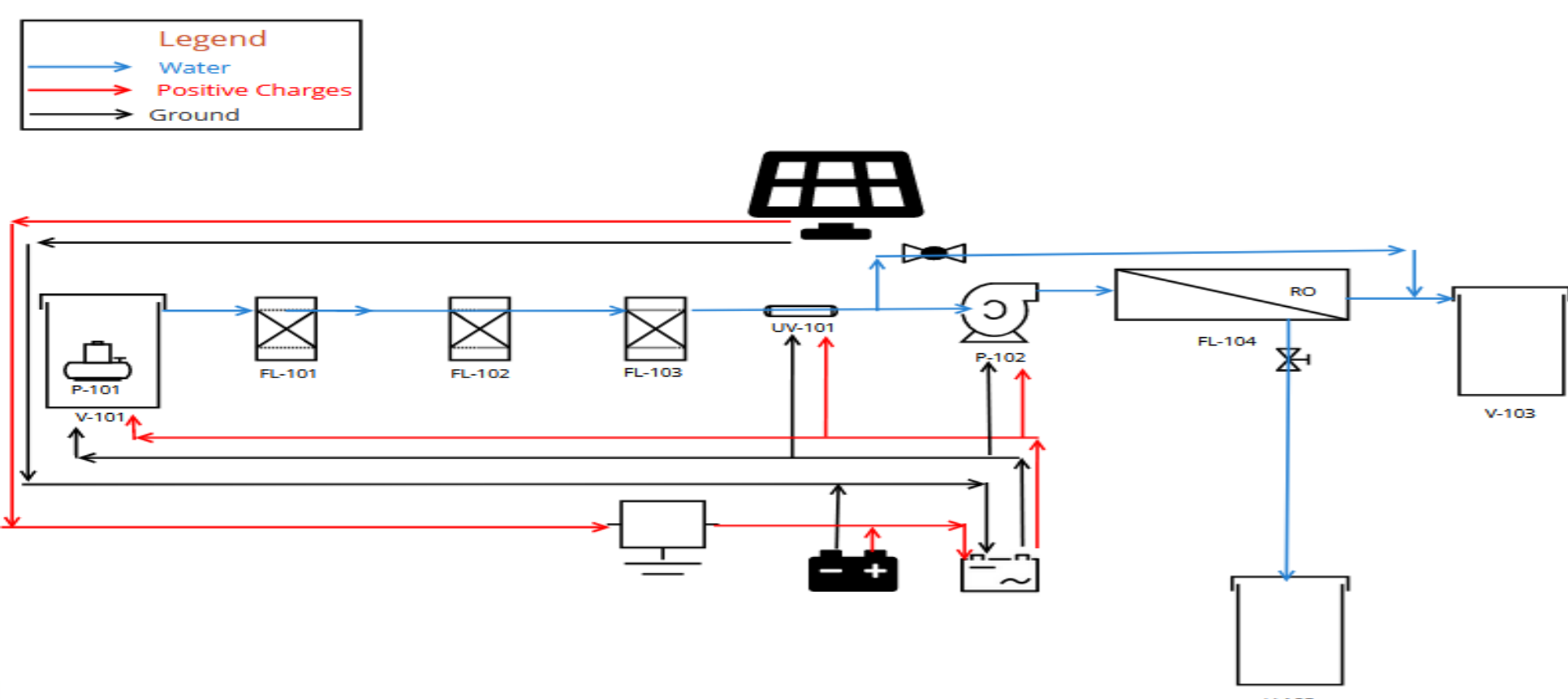
4. TARGET SPECIFICATIONS

<p>Water Quality follows the SFDA: TDS 100-150 ppm PH 6.5-8.5</p>	<p>Power Consumption: < 2 kWh/m³</p>	<p>Time: 6 hours/day</p>	<p>Quantity: 2 m³/day</p>
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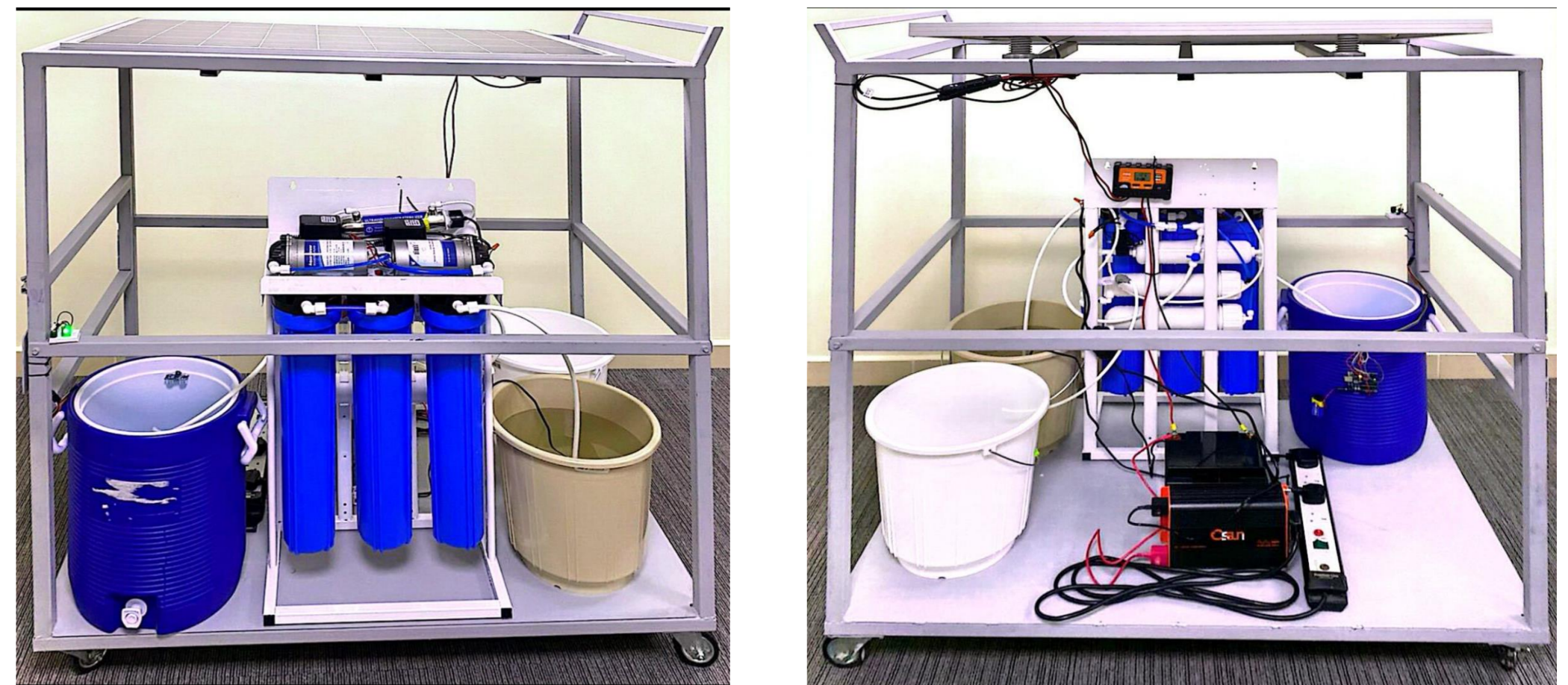
5. CONSTRAINTS

<p>Power Supply and Storage Optimization.</p>	<p>Variation in Water Quality.</p>
<p>Maintenance and Serviceability.</p>	<p>Environmental and Regulatory Considerations.</p>

6. PROCESS FLOW DIAGRAM



7. PROTOTYPE IMAGES



8. PROJECT COST

The Total cost of the system is 5850 SAR

9. TESTING / VALIDATION

Array	Vessels	Feed (bar)	Conc (bar)	Feed (m3/h)	Conc (m3/h)	Flux (lmh)	Highest flux (lmh)	Highest beta
1-1	1	9.1	9	0.4	0.08	42.9	42.9	3.25

Permeate Concentration	
Ca	13.261
Mg	1.986
Na	24.251
NH ₃	0.000
K	0.410
NH ₄	0.000
Ba	0.000
Sr	0.000
HC03	11.902
S04	29.799
Cl	37.655
N03	0.735
F	0.000
P04	0.006
Si02	0.000
B	0.000
CO2	5.225
CO3	0.030
pH	6.5
TDS	120.04 mg/l

Power Calculation		
Pump / Boost pressure	bar	9.1
Product flow	m3/h	0.3
Pump flow	m3/h	0.4
Pump efficiency	%	75.0
Motor efficiency	%	75.0
VFD Efficiency	%	97.0
Power/Stage/Pass	kw	0.2
	BHP	0.2
Total pumping power	kw	0.2