

Under the Patronage of His Excellency **Eng. Abdulrahman bin Abdulmohsen AlFadley**
Minister of Environment, Water & Agriculture

منتدى المياه السعودي
saudi water forum

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Treated Sanitary Effluent Reuse for Cooling Plants

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Hilton Riyadh Hotel & Residences
Riyadh, Saudi Arabia

Organized by

وزارة البيئة والمياه والزراعة
Ministry of Environment Water & Agriculture



المؤسسة العامة لتحلية المياه المالحة
Saline Water Conversion Corporation (SWCC)



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Organizing Partners

Outline

- Background
 - Challenges with Groundwater as *Make-up* water
 - Description of the Pilot Study
 - Techno-Economic Assessment of Using TSE
 - Conclusions
-

Background

- The objective is to demonstrate the application of Treated Sewage Effluent as make-up water for cooling systems.

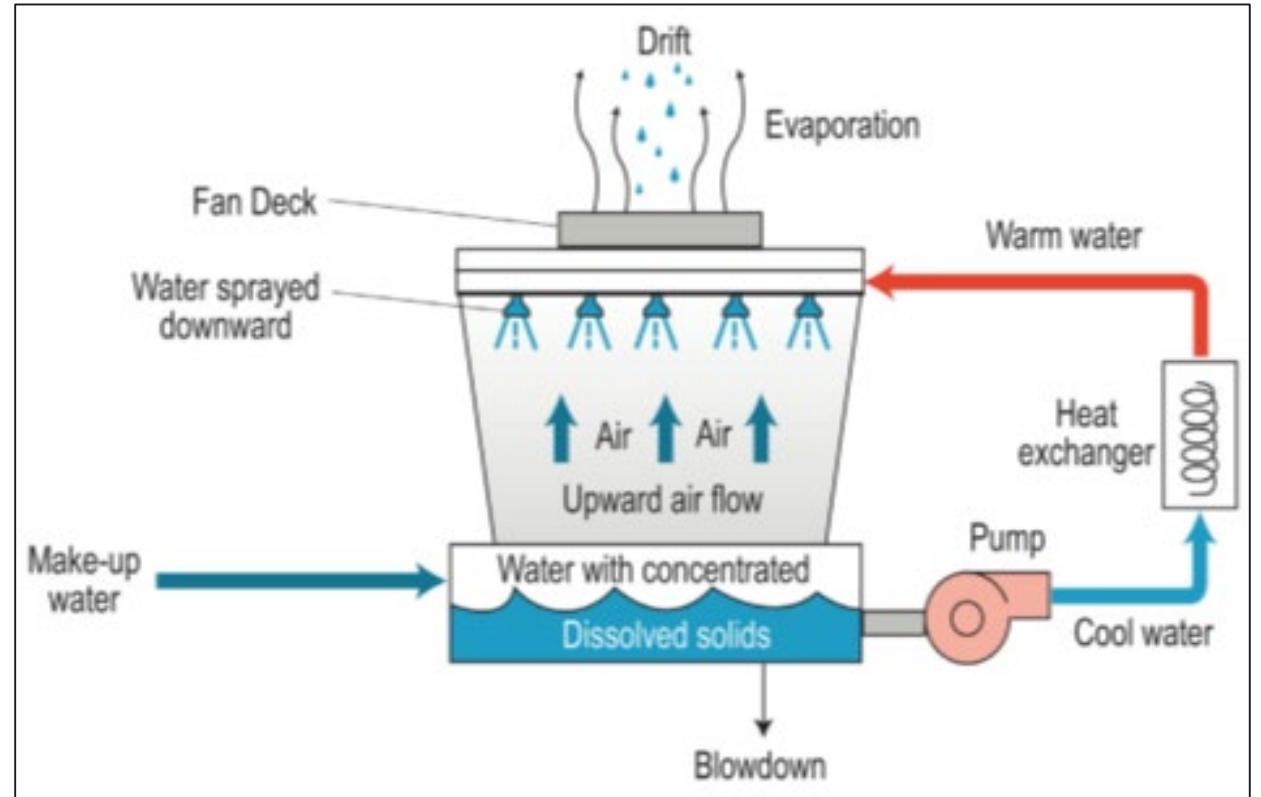
- Make-up water Sustainability:



Find an alternative to groundwater use



Use of Treated Sewage Effluent (TSE) as make-up water for cooling systems



Challenges of Using Groundwater



Low Water Efficiency

Cycle Of Concentration (COC) was limited to **1.5**



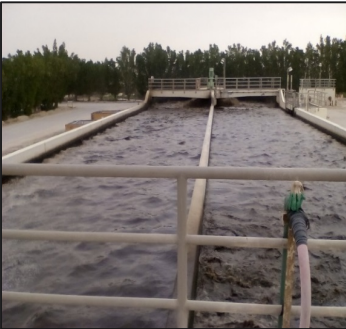
Operational Challenge

Severe scaling on the condenser surfaces



Constituents	Concentration in Raw Water (mg/L)
Calcium	233
Magnesium	97
TDS	3,040

Description of the Pilot Study



Abqaiq Regional Sewage Treatment Plant

TSE Assessment of Make-Up Water



TSE Water Composition



Biohazard Assessment



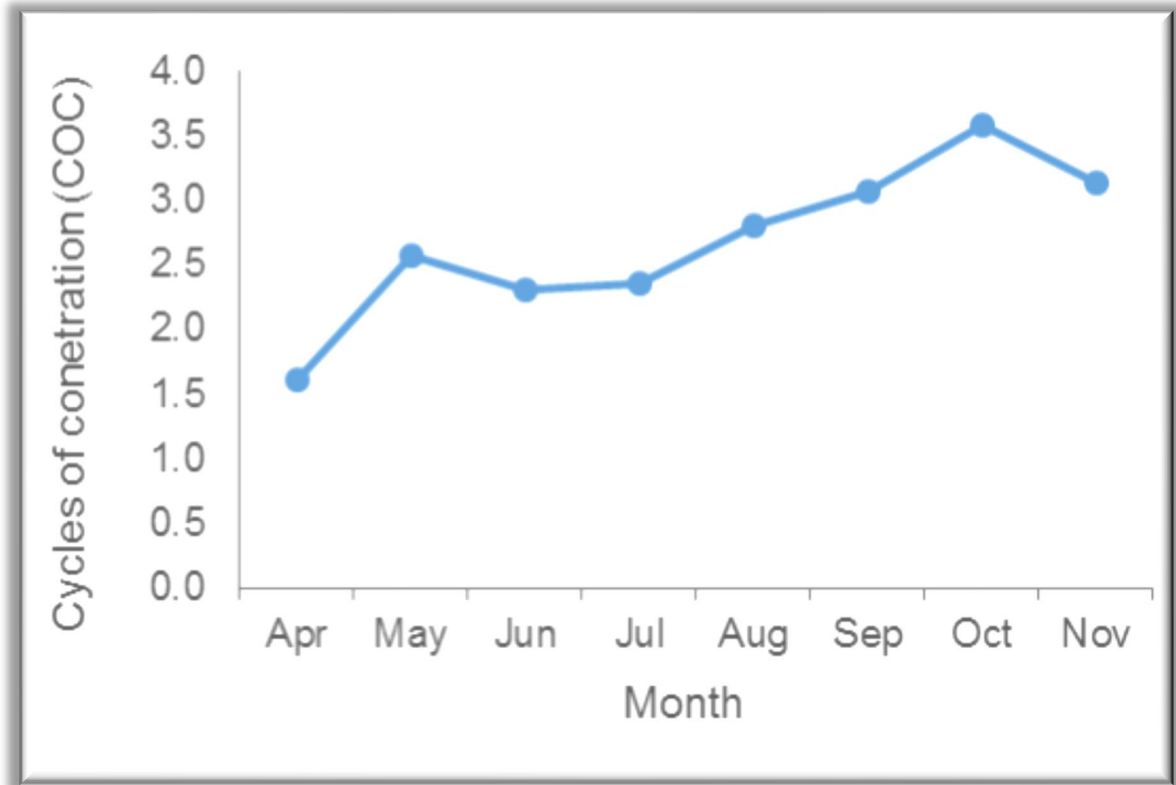
Equipment Reliability



Benefits



TSE Water Efficiency



High Water Efficiency

COC of the cooling tower operation could be almost doubled from 1.5 to 3.5



Low Fouling Potential

Langelier Saturation Index (LSI) values are Low compared to groundwater

Biohazard Assessment: Bacteria and Virus

	Klebsiella Species	Legionella pneumophila SG1	Legionella pneumophila SG2-14	Legionella Species	Total Coliform
Unit	CFU/100 mL	CFU/L	CFU/L	CFU/L	CFU/100mL
LOR	1	10	10	10	1
Results	<1	<10	<10	<10	<1

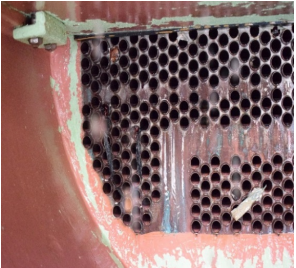
	Sampling Points - Enteric Virus detected			
Sample	Raw Sewage	STP post treatment	Make up TSE water	Circulation Line
Results	Yes	No	No	No

*Analyses were conducted in King Faisal Specialist Hospital & Research Center

Equipment Reliability



Low Scaling Potential



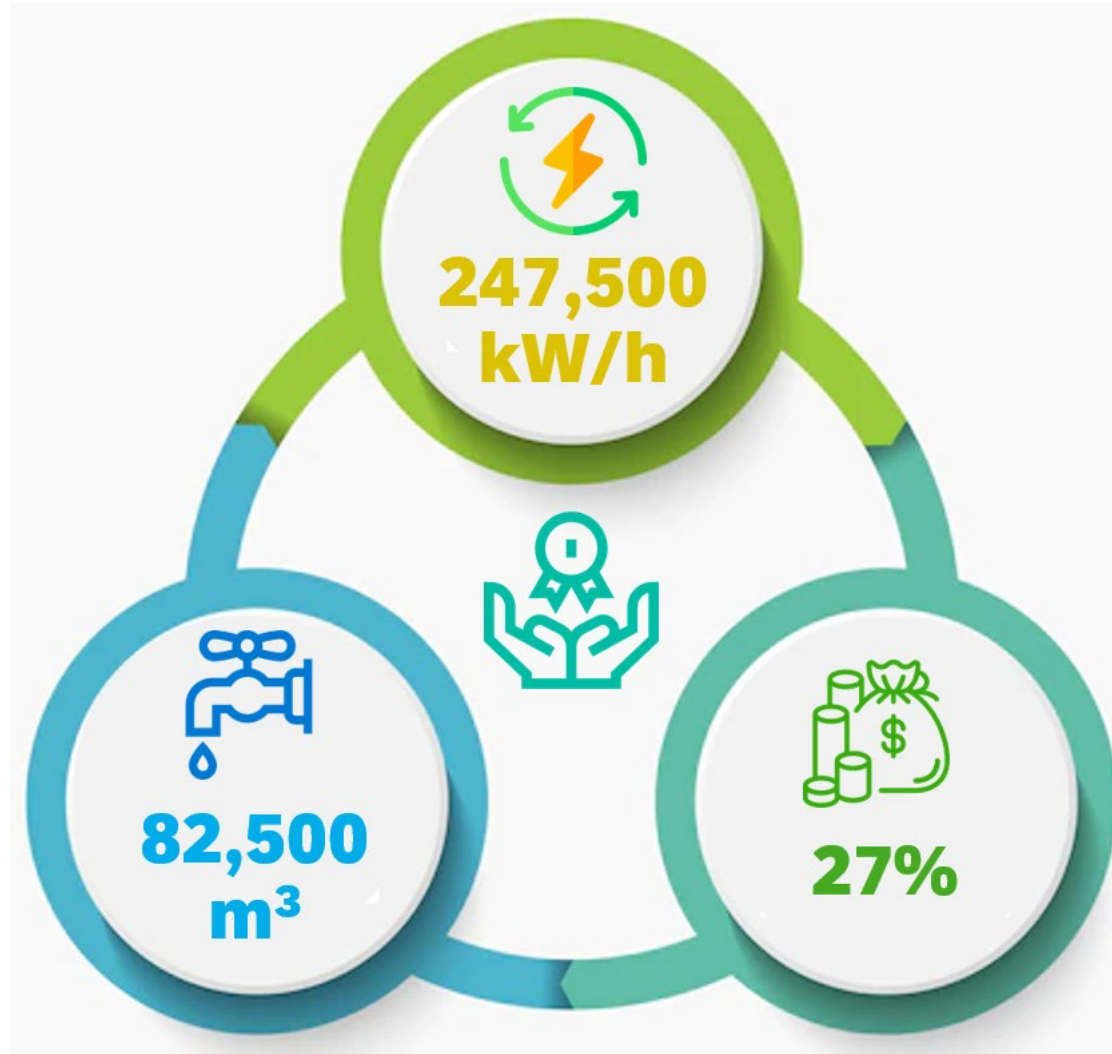
Low Maintenance



Low Corrosion Potential



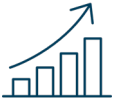
Economic Benefits



Summary



TSE is a sustainable alternative to groundwater for cooling plants



Use of TSE can positively effect reliability of the equipment



Site specific evaluation is necessary prior to deployment at other locations

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