Oral Presentation

Sustainable concept to recovering industrial wastewater using adjustable green resources

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Agenda

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02 Objectives
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Introduction

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because of the need to reduce withdrawals from the natural environment and the protection of the environment

01 Need to seek new remedies including the reuse of industrial water

02 non-conventional water resources such as desalination of sea water, reuse and recycling of treated wastewater are developing recently

03 The water resources of Morocco are mainly conventional resources (surface and groundwater).

04 The irreversible depletion of natural resources, particularly water, and the degradation of their quality remains a major challenge of the 21st century.

Objectives

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Objective 01

Analyze the chemical composition of industrial wastewater

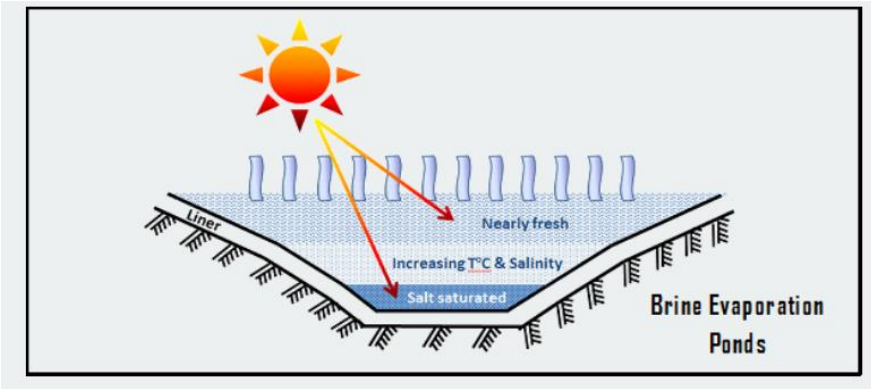
Objective 02

Study the Sun radiations effect on water' physicochemical parameters

Objective 03

Use renewable energy to recycle wastewater

Evaporation ponds



The construction of industrial sites using water treatment process

Evaporation ponds have been proposed in many Environmental Aspect Impact studies.

Avoid wastewater discharge into the superficial water

Avoid superficial water pollution by industrial wastewater

Effectiveness Practical study

Present several environmental and Ecological risks

Recycle/ reuse of industrial wastewater

Effective Environmental Solution

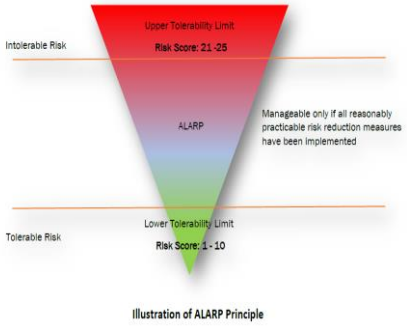


Illustration of ALARP Principle

Materials & Methods

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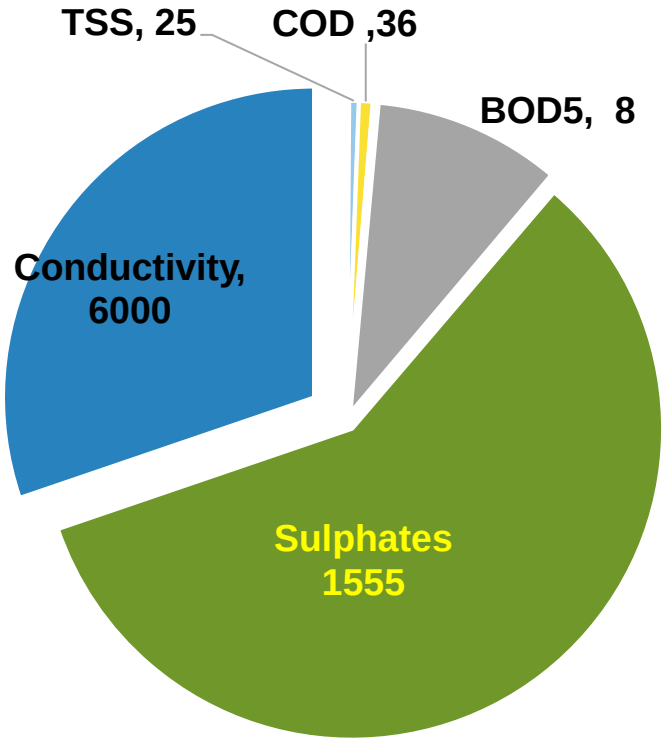
01 **Study of the physico-chemical composition of industrial wastewater** — **Sampling from the effluent's (before discharge) and storage ponds wastewater.**

02 **Sampling area** — **Power station in Morocco**

03 **Sampling period** — **November 2021- October 2022**

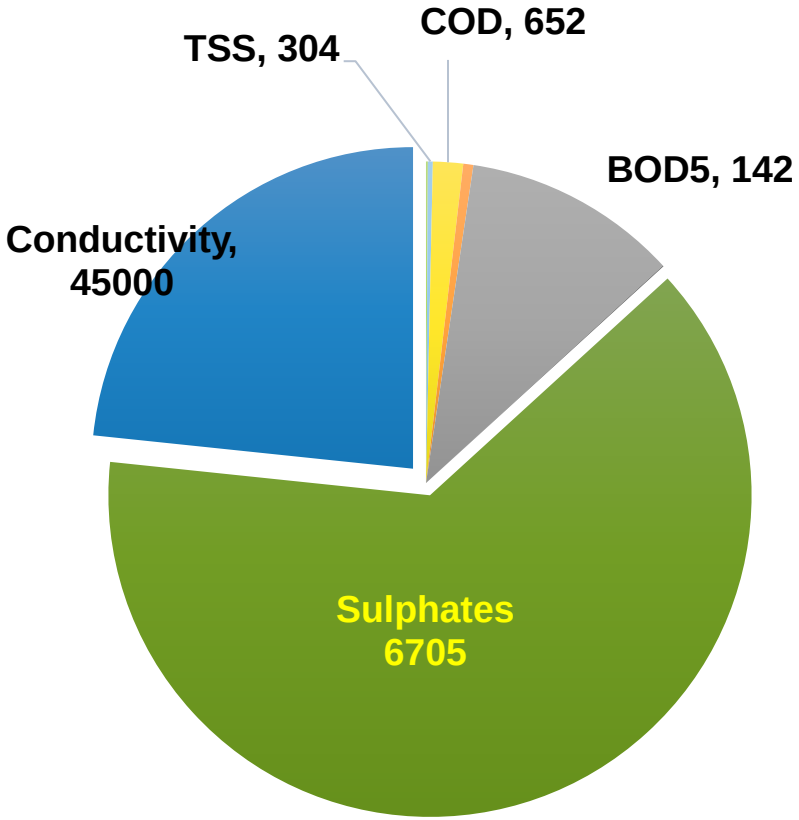
04 **Statistical Methods** — **Regression Analysis**

Evolution of physico-chemical parameters (average)



Sun Radiation effect on water'

physico-chemical parameters



- Conductivity (us/cm)
- COD & BOD5 (mgO2/l)
- TSS & SO4 (mg/l)

Results of Physico-chemical evaluation

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This Table shows that the main effluent parameters (COD, BOD5, EC, SO4 and TSS) exceeded the maximum level imposed by Moroccan regulation for effluent released into the environment (MINISTERE DE LA TRANSITION ENERGETIQUE, 2015)

Parameter	unit	Limit	11/21	12/21	01/22	02/22	03/22	04/22	05/22	06/22	07/22	08/22	09/22	10/22
pH	pH unit	5.5-9.5	8.1	7.9	7.6	7.9	8.0	7.5	7.6	8.1	8.1	7.1	7.7	8.0
EC	ms/cm	2.7	9	18	19	23	38	18	45	26	33	28	44	36
SO_4	mg/l	600	1800	1840	2320	1985	1300	3500	2900	4256	1987	2692	2569	4200
TSS	mg/l	100	102	79	105	129	153	304	215	116	98	197	203	171
COD	mg O2/ l	500	356	620	560	519	614	652	498	516	563	578	452	512
BOD5	mg O2/ l	100	95	120	95	115	118	103	142	109	98	102	115	124

Regression analysis Results

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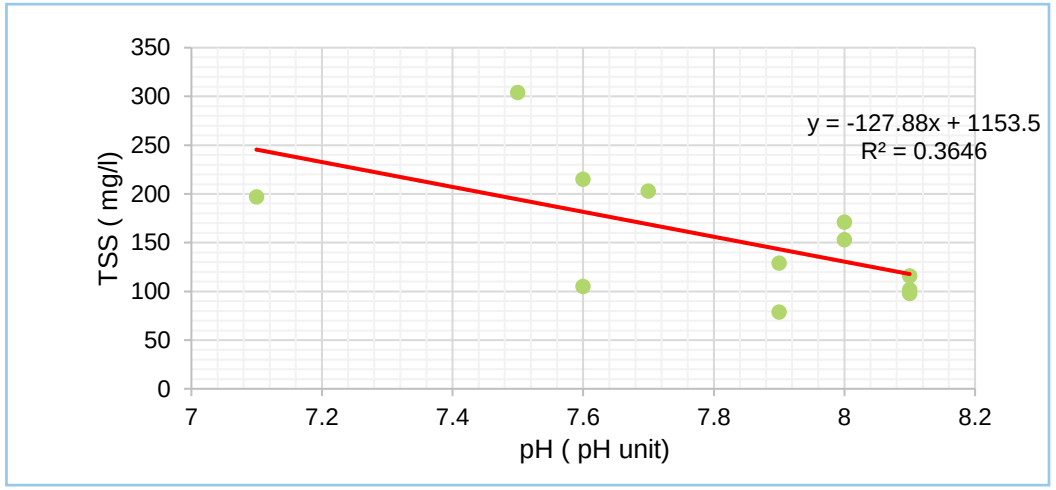

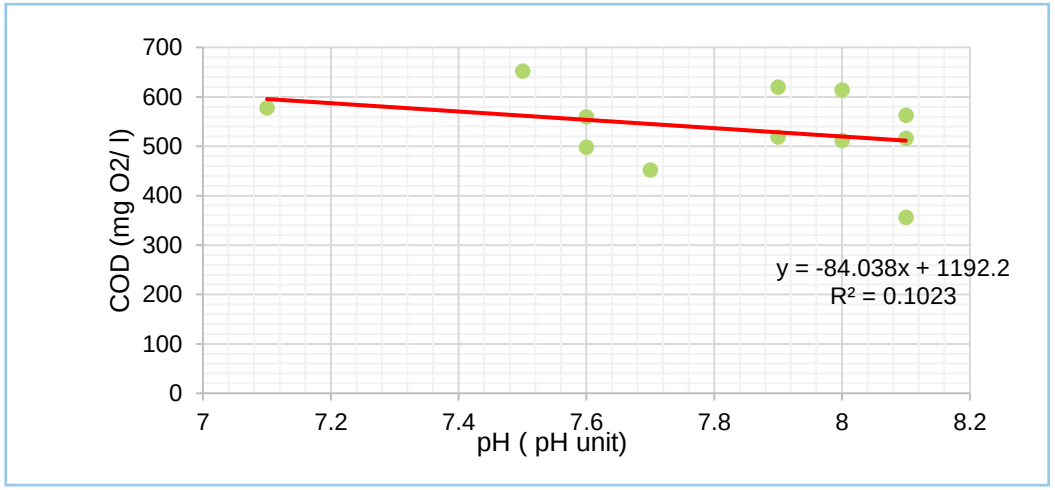

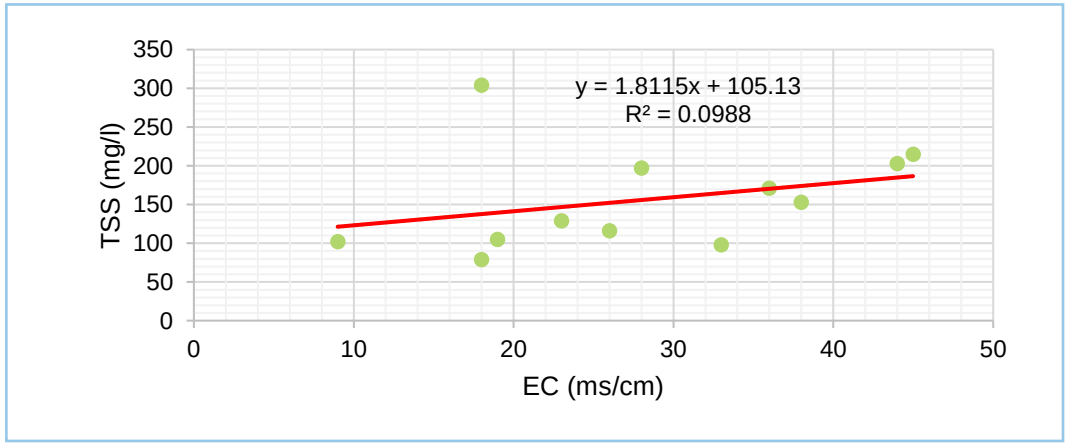

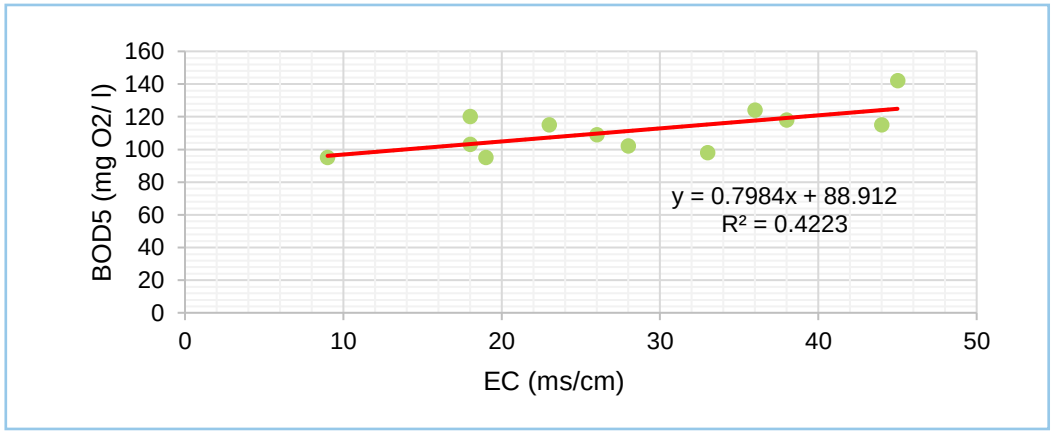

Scatter plots showed positive linear relationships between total suspended solids (TSS) and SO4, total suspended solids (TSS) and EC, and BOD5 and EC. Nonetheless, both TSS and COD show negative linear relationships with ph.

Results and Discussion

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- Storing of wastewater in the open air has a deleterious impact on the Physico-chemical and bacteriological properties of industrial effluents, as evidenced by an increase across various effluent properties that exceeds the maximum limits specified by international regulations. Since this phenomenon has the potential to cause ecological and environmental damage, it is imperative that every industry do a thorough environmental risk assessment to determine the most appropriate response.
- This research and analysis bring us to the conclusion that discharging effluent into evaporating basins is not a viable solution due to the severe negative consequences it has on the environment and its resources.

➢ Consequently, we propose that industries, especially power plants, use environmentally friendly strategies for recycling this effluent. As a result, this might help businesses justify charging higher rates for water consumption.

Proposed sustainable alternative

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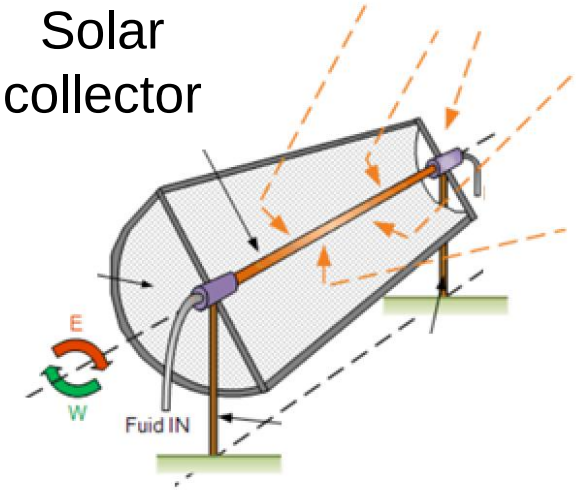
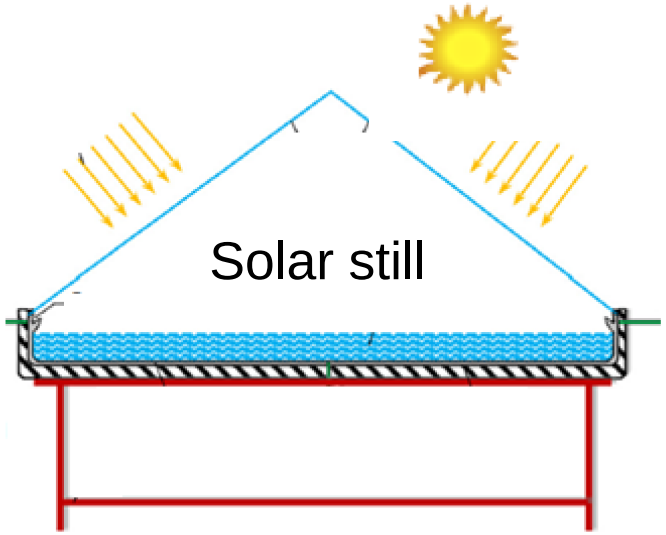
Solar collector

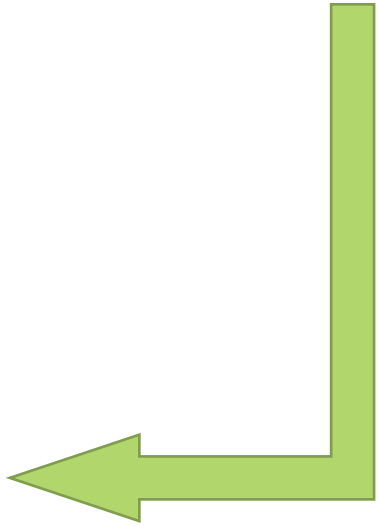


Hot water

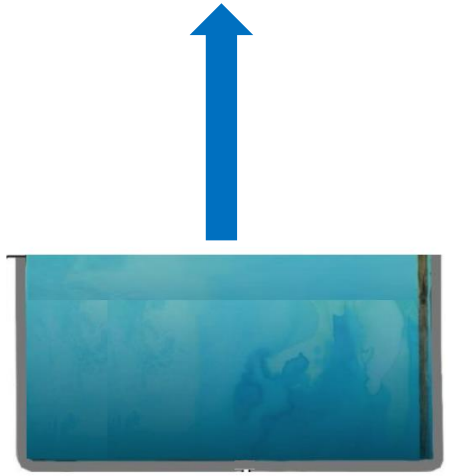


Solar still

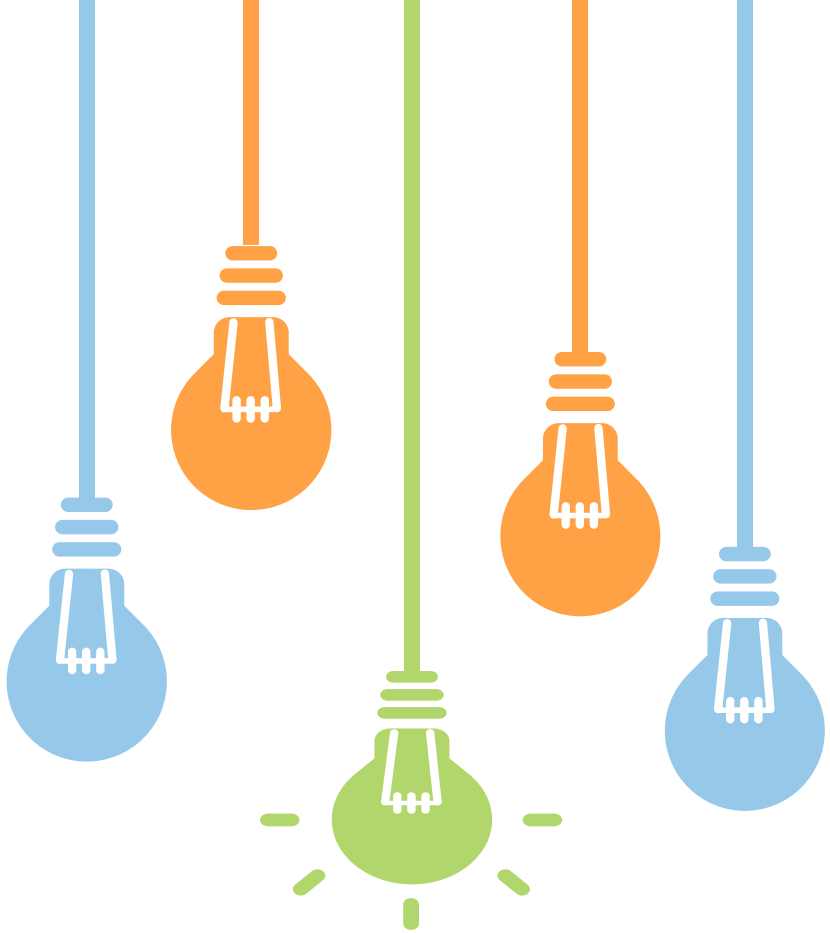
Fresh water



Process water



Effluent



Recommendation

To optimize the use of sustainable energy to reuse effluent discharged into evaporation ponds, the incorporation of CSP technologies with reflector collectors is recommended.

Conclusion

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The results obtained on the effect of the phenomenon of evaporation on industrial wastewater show a considerable increase of the physico-chemical parameters in particular the conductivity, the sulphates, the suspended solids, BOD5 and the chemical oxygen demand COD.

The proposed eco-friendly option for businesses that utilize evaporation ponds is to install huge sustainable solar stills instead. This has the dual benefit of conserving the environment and reusing wastewater. Because of this, businesses will be able to save money on water bills while reusing wastewater.

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