



9th International Interdisciplinary Congress on Renewable Energies, Industrial Maintenance, Mechatronics and Informatics

Booklets



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Title: Using latent heat from a water purification system to improve the performance of an absorption heat transformer

Authors: Morales, L.I., Siqueiros J.b, Juárez-Romero D.c and Hernández-Soria A.H

Universidad Autónoma del Estado de Morelos T-6933-2018 000-0001-7500-6202 45697
 Consultor Independiente LFU-6509-2024 0000-0002-2504-2632 2012
 Universidad Autónoma del Estado de Morelos E-2056-2016 0000-0003-0942-9738 9643
 Universidad Autónoma del Estado de Morelos LFT-5450-2024 0000-0002-0126-0336 336706

Editorial label ECORFAN: 607-8695
BCIERMMI Control Number: 2024-01
BCIERMMI Classification (2024): 241024-0001
RNA: 03-2010-032610115700-14
Pages: 13

CONAHCYT classification:
Area: Engineering
Field: Technological science
Discipline: Energy technology
Subdiscipline: Unconventional source of energy

ECORFAN-México, S.C.

Park Pedregal Business. 3580,
Anillo Perif., San Jerónimo
Aculco, Álvaro Obregón,
01900 Ciudad de México, CDMX,
Phone: +52 1 55 6159 2296
Skype: ecorfan-mexico.s.c.
E-mail: contacto@ecorfan.org
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PRESENTATION CONTENT

Introduction

Metholodology

Results

Conclusions

References

INTRODUCTION

Absorption Heat Transformer

They use a small amount of mechanical energy, which is required for process pumps

The working fluids they use have no adverse effects on the environment

Its main components are not sophisticated, as in the case of compressors

They are easy to design, since it is only necessary to know the thermodynamic properties of the working mixture.

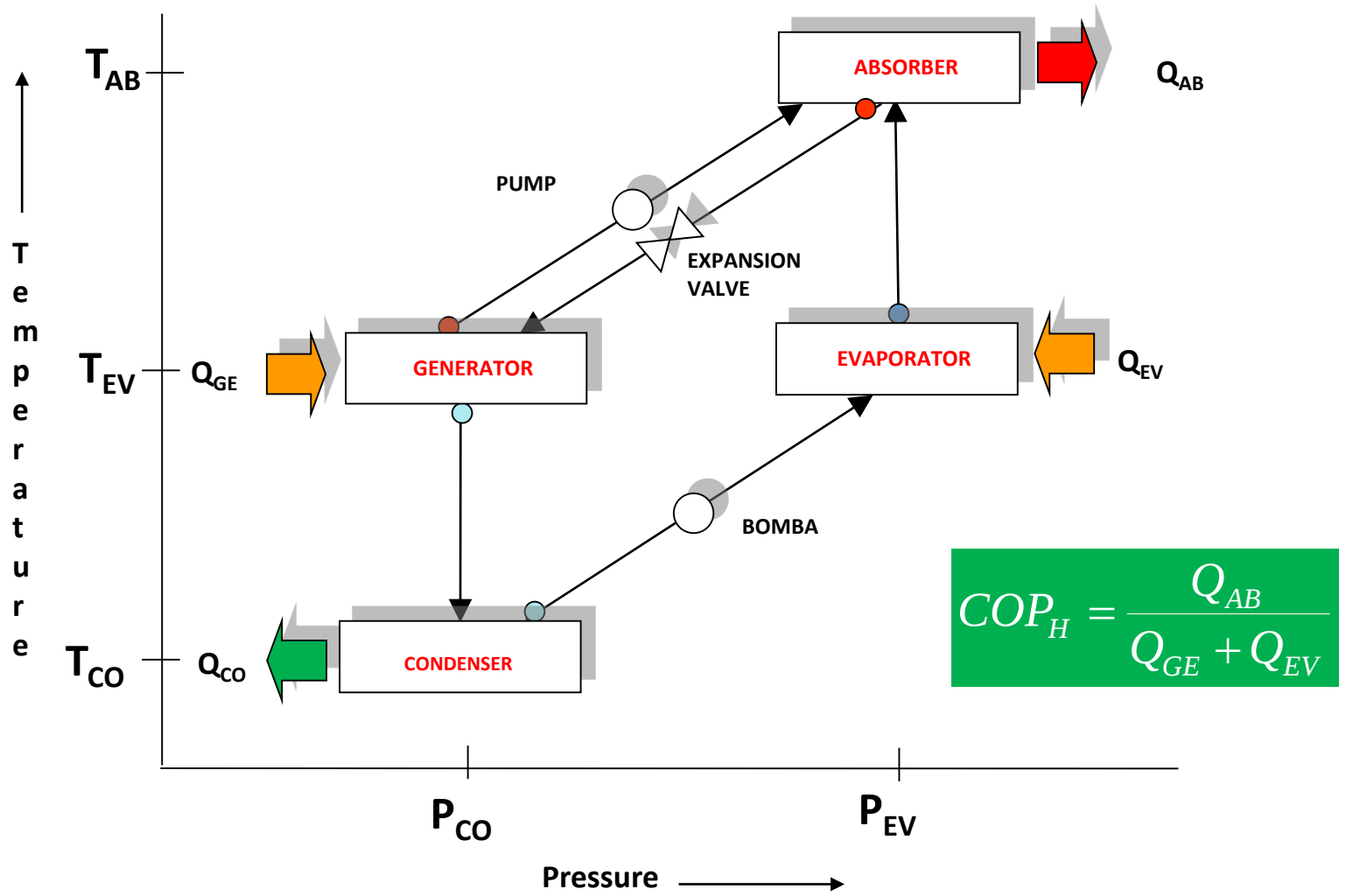


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INTRODUCCIÓN



Absorption Heat Transformer Cycle

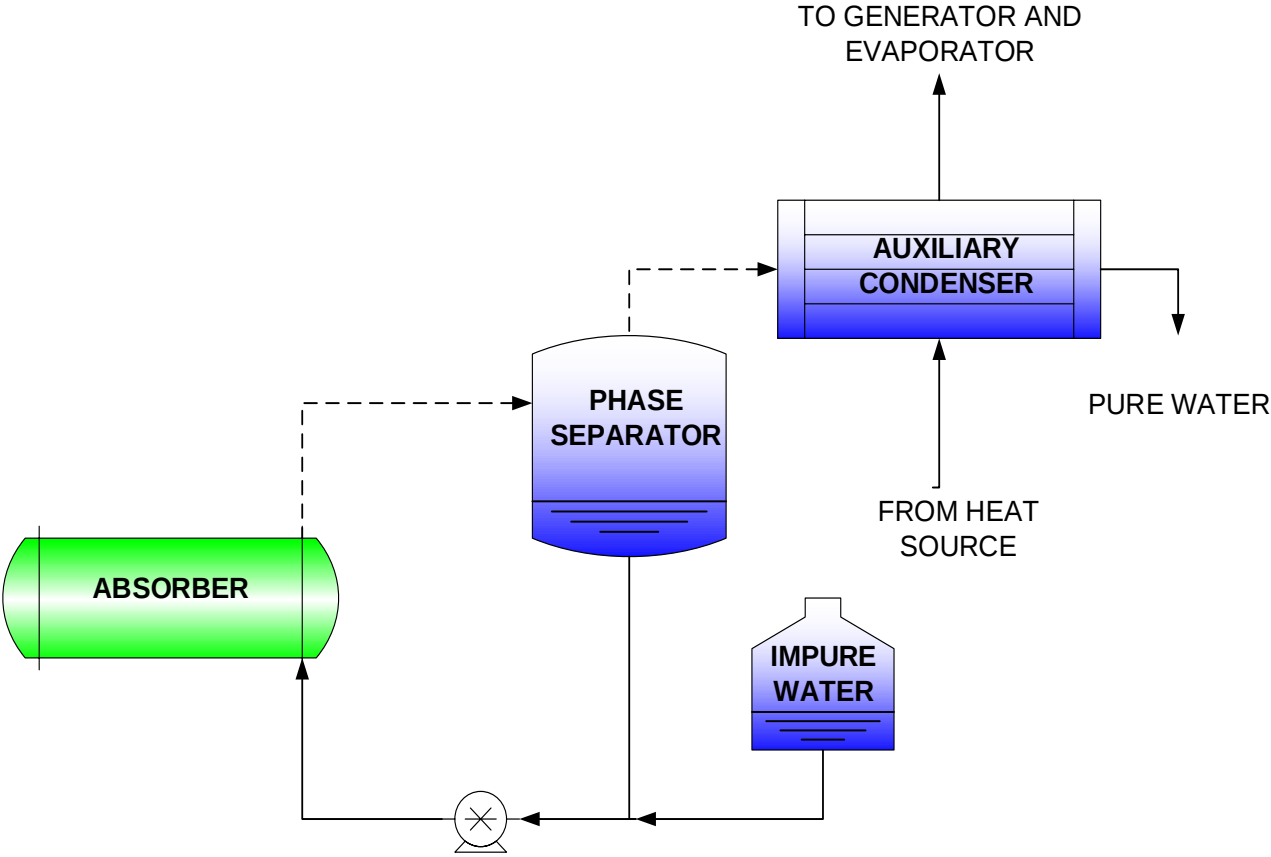




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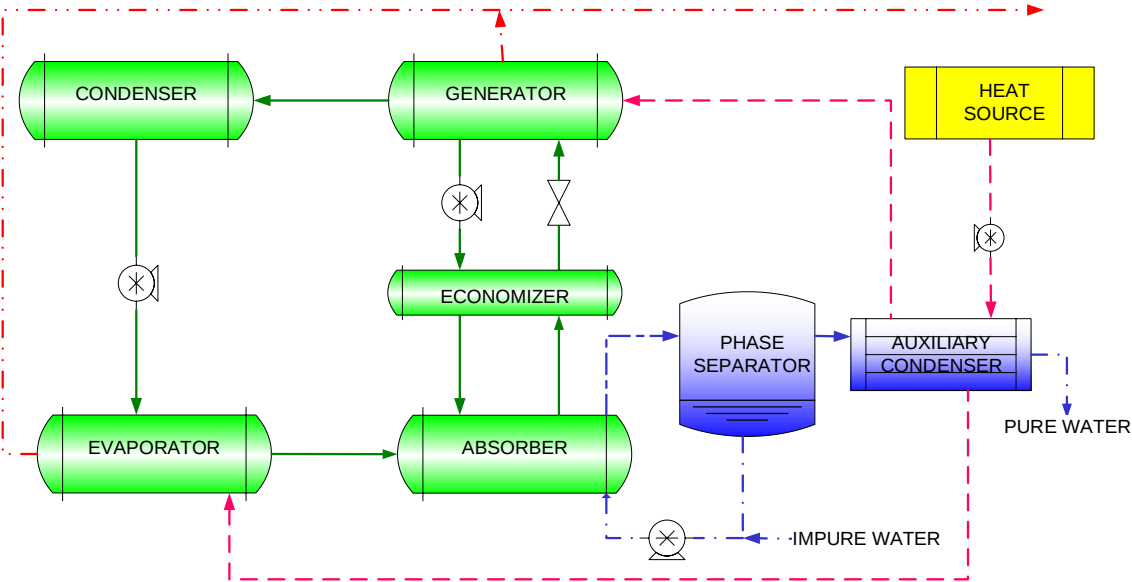


WATER PURIFICATION PROCESS



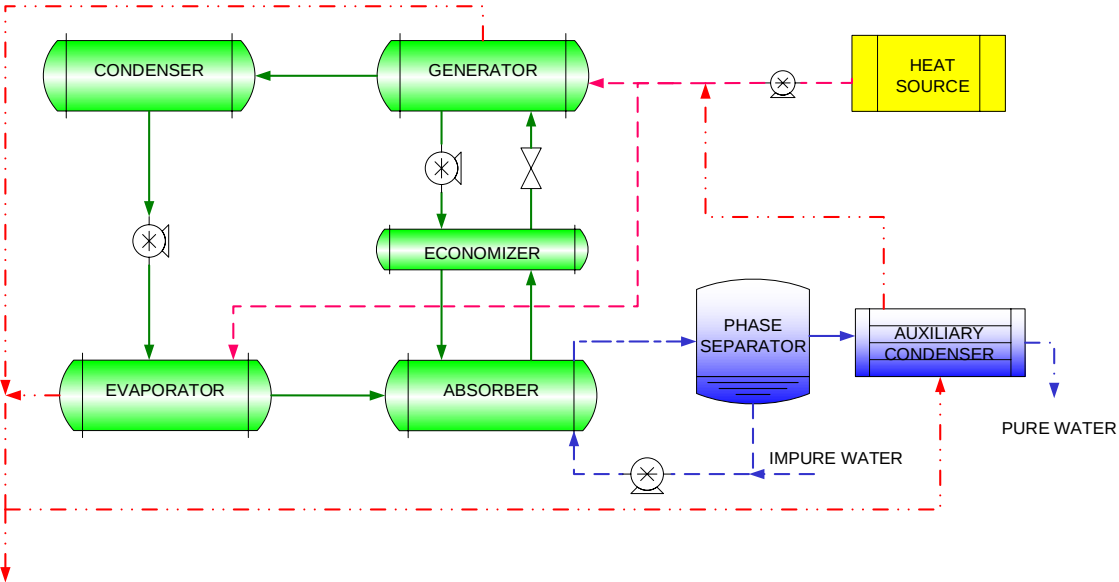


CASES OF HEAT RECYCLING



CASE I

CASE II





METHODOLOGY

Amount of energy recycling to the AHT $Q_{\text{REC}} = \eta Q_{\text{AB}}$

Where η is defined as: η is a constant with a value of 0.877

$$\eta = \frac{\Delta H_V}{\Delta H_V + \Delta H_S}$$

Energy balance in the heat source $Q_{\text{HS}} = m_{\text{HS}} C_p \Delta T_{\text{HS}}$

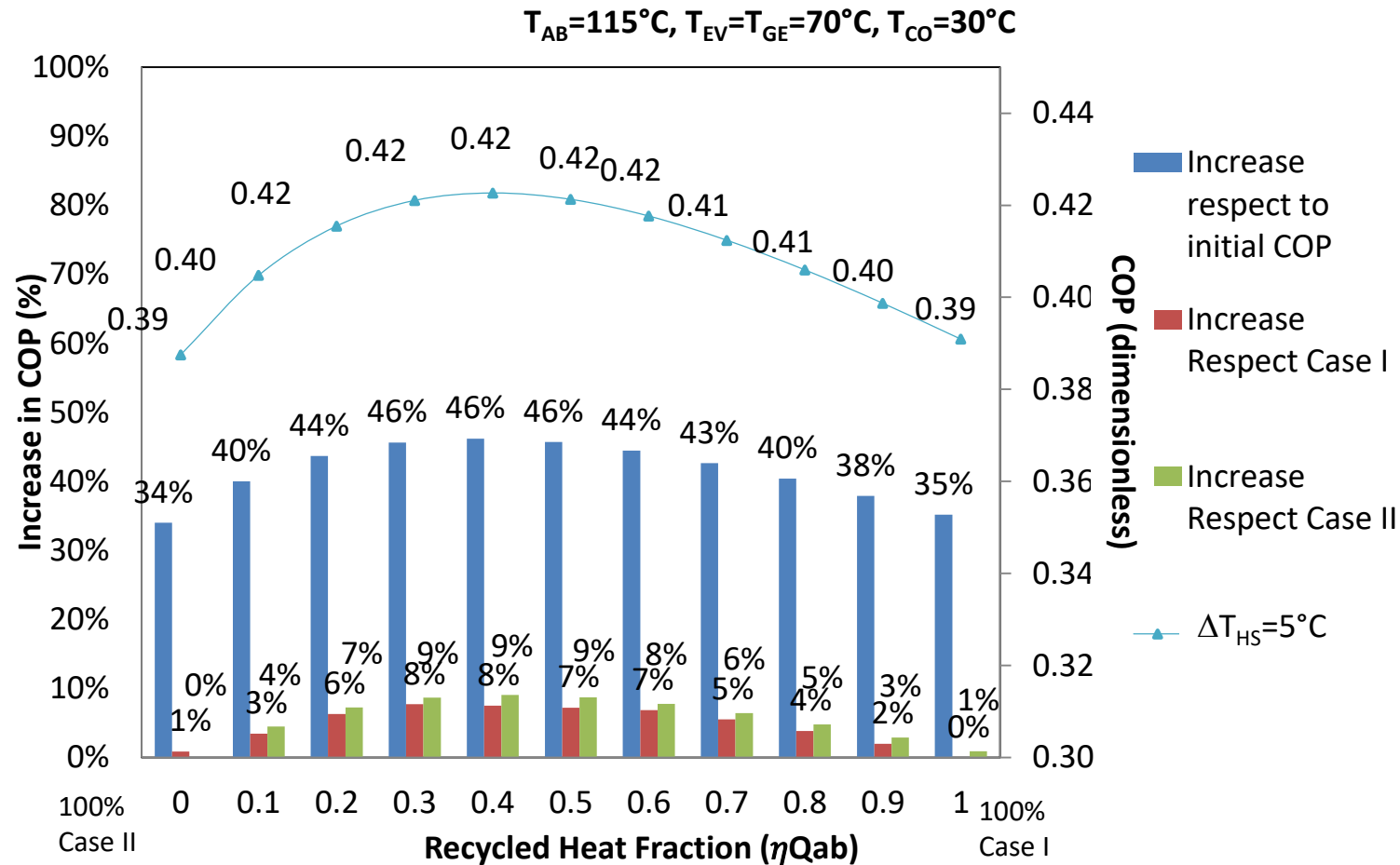
Increased in a quantity ΔT_N $\Delta T_N = \eta \text{COP}_{\text{ET}} \Delta T_{\text{HS}}$

- New temperatures in the evaporator and generator

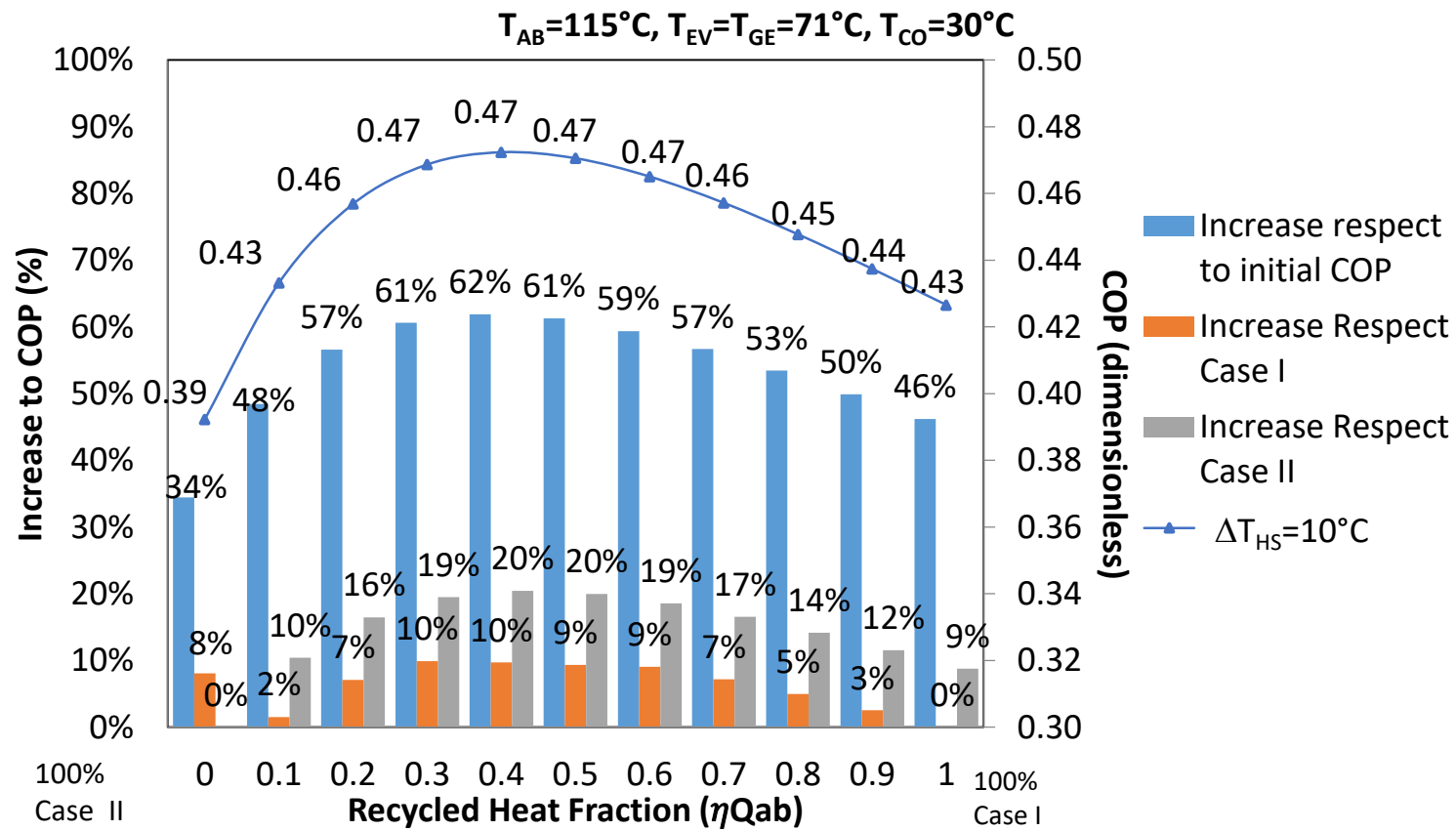
$$\begin{aligned} T_{\text{EV},N} &= T_{\text{EV}} + \alpha \Delta T_N \\ T_{\text{GE},N} &= T_{\text{GE}} + \alpha \Delta T_N \end{aligned}$$

New COP for combination recycling $\text{COP}_N = \frac{\text{COP}_{\text{ET}}}{1 - \beta \eta \text{COP}_{\text{ET}}}$

RESULTS



RESULTS

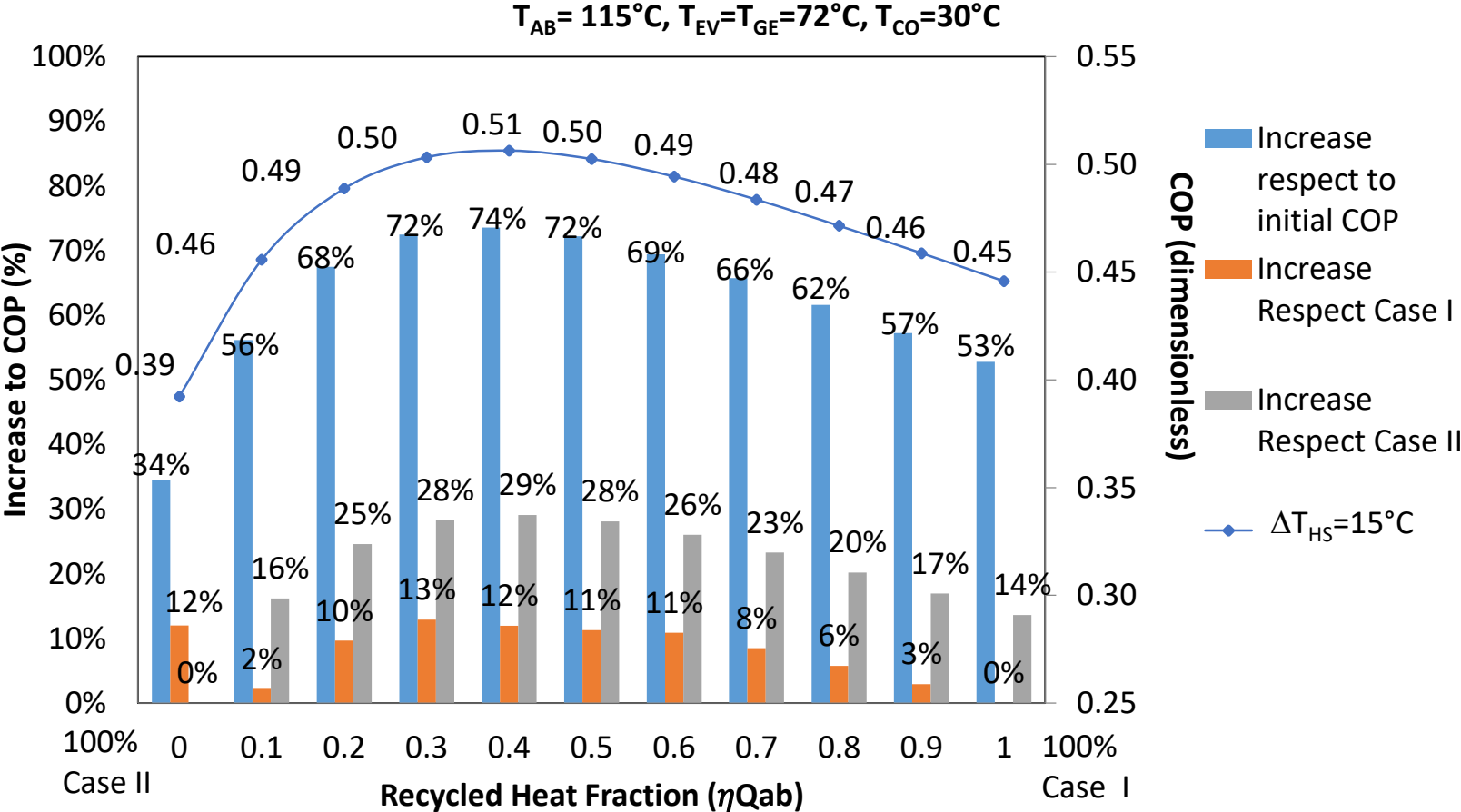




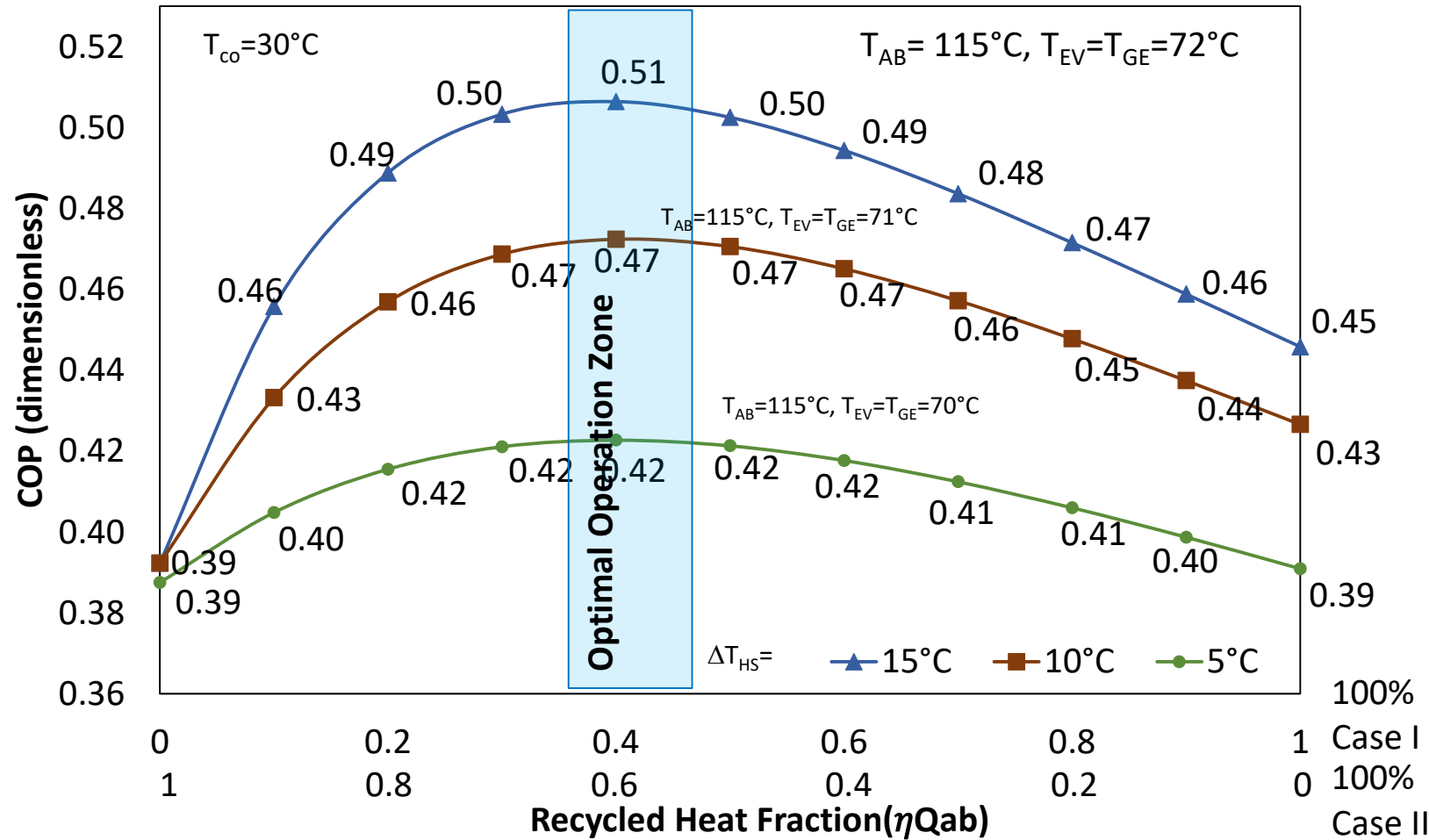
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RESULTS



RESULTS



CONCLUSIONS

1

Adding an auxiliary condenser II to the water purification circuit integrated to a thermal transformer increases the COP_H values

2

The COP_{WP} increases with the latent heat of the purified water, which depends on the quality of the impure water and the atmospheric pressure

3

When heat is recycled, COP increases from 46% to 74%.

4

Combining 40% to Case I and 60% to Case II is the best option



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