Use of reinforcement learning to optimize the control of solar thermal collectors coupled to seasonal thermal energy storage

Alicia Crespo, Álvaro de Gracia, David Vérez, Luisa F. Cabeza, Cèsar Fernández*

GREiA Research Group, Universitat de Lleida, Pere de Cabrera s/n, 25001-Lleida, Spain

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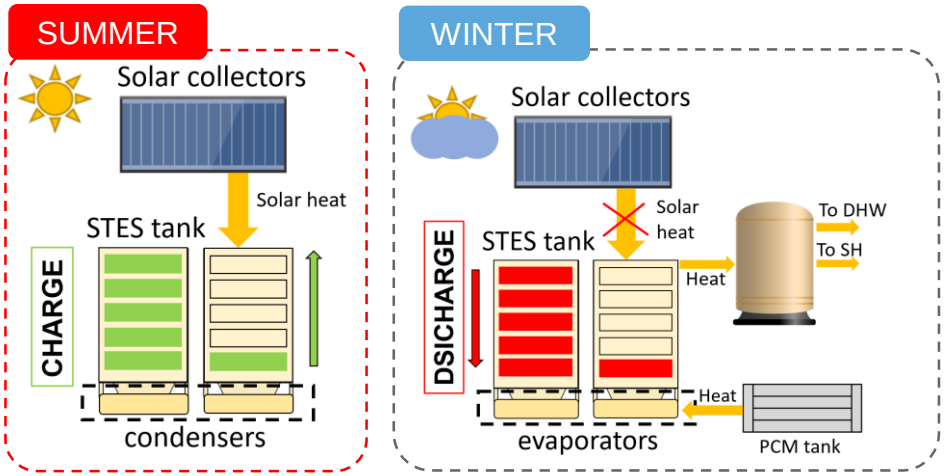
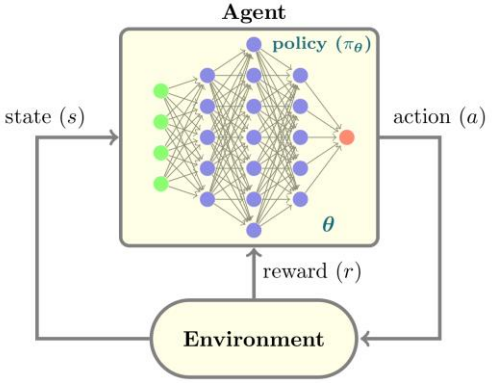
Introduction

- Seasonal thermal energy storage (STES) allows to store solar heat in summer and release it in winter.
- Selective water sorbents are hydrated salts (salts+H_2O) which can store heat at long-term with low heat losses.
- Smart control is necessary to optimize the control of complex energy system.

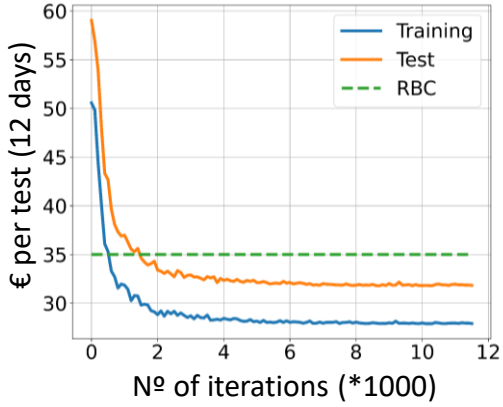


Methods and results

- The thermal performance of the system was simulated using physical models developed in Python.
- The agent of the smart control algorithm was trained using the reinforce policy gradient algorithm.



Deep reinforcement learning concept



Training process of agent

Conclusions

Long episodes are necessary to train the agent of the STES.

Smart control policy is around 9% cheaper than a traditional rule based control (RBC) policy.

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C/ Pere de Cabrera, s/n,
25001 Lleida
Tel. +34 973 003 704
cesar.fernandez@udl.cat

www.greia.udl.cat