Manuscript Number: **EST-D-24-02349**     
  
Decarbonizing an industrial process through a combined, high-temperature CSP and sensible heat storage  
  
Dear PhD Martin,  
  
Thank you for submitting your manuscript to Journal of Energy Storage.  
  
I have completed my evaluation of your manuscript. The reviewers recommend reconsideration of your manuscript following major revision. I invite you to resubmit your manuscript after addressing the comments below. Please resubmit your revised manuscript by **Jun 04 2024 11:59PM**.  
  
When revising your manuscript, please consider all issues mentioned in the reviewers' comments carefully: please outline every change made in response to their comments and provide suitable rebuttals for any comments not addressed. Please note that your revised submission may need to be re-reviewed.   
  
To submit your revised manuscript, please log in as an author at <https://www.editorialmanager.com/est/>, and navigate to the "Submissions Needing Revision" folder.    
  
Research Elements (optional)  
This journal encourages you to share research objects - including your raw data, methods, protocols, software, hardware and more – which support your original research article in a Research Elements journal. Research Elements are open access, multidisciplinary, peer-reviewed journals which make the objects associated with your research more discoverable, trustworthy and promote replicability and reproducibility. As open access journals, there may be an Article Publishing Charge if your paper is accepted for publication. Find out more about the Research Elements journals at <https://www.elsevier.com/authors/tools-and-resources/research-elements-journals?dgcid=ec_em_research_elements_email>.  
  
  
Journal of Energy Storage values your contribution and I look forward to receiving your revised manuscript.  
  
Kind regards,     
Luisa F. Cabeza     
Editor-in-Chief    
  
Journal of Energy Storage  
  
Editor and Reviewer comments:  
  
  
  
Reviewer #1: The authors present the hybridization of three subsystems to provide a constant energy output (27kW) at a constant temperature (1000K): a solar parabolic dish collector with a pressurized volumetric receiver, a TES system containing carbon blocks and an auxiliary energy input coming (preferably) from renewable energy sources. The authors clearly describe all the subsystems, the algorithms employed to decide whether the air should charge, discharge or bypass the TES system, and the external/ambient conditions according to the location (Córdoba or Málaga). It is interesting how the authors explain the trade-off between the renewable energy sources within the Spanish electric grid framework when analyzing the economic cost of the system.  
  
The paper is well-written and organized. However, I recommend the authors check the following issues:  
  
(1) Introduction, last paragraph on page 2.  
- The authors say "Due to their optical efficiency and the nature of materials (e.g. nickel foam), and of course depending on the dish surface,..". It is not clear which material and which part are you referring to. This sentence seems to state that the solar collector is made of Nickel foam. And that is not true.  
- The authors say "...Concentrated radiation enters the receiver through a high-temperature glass window (made of e.g. quartzite). Inside the receiver,... with the aim of heating a Nickel foam, which is the heart of the solar dish." That is the description of the system they use within their work, but please, note that not all the parabolic dishes and solar receivers are like this. Some receivers could be, for example, opened to the air, without a window. Please, clarify this issue within the introduction.  
  
(2) Introduction, page 3, lines 39-40 , left column.  
- I think something is missing here, some connector within the sentence  
  
(3) Section 2 (Description of the proof-of-concept). Page 4, line 28, right column:  
-It is said "As shown in Fig. 2, air passes through solar dishes and undergoes a temperature..." but I think it is Fig. 1. Please, revise it.  
  
(4) Section 3 (Description of the numerical models involved in the cycle). Figure 2, page 6.  
- Please, I strongly encourage the authors to cite or mention the source of this figure in the caption, for example "adapted from García-Ferrero et al." The notation of some geometrical parameters, the scheme itself and the split and description of the system in Zones (1,2,3,4) are originally from García-Ferrero et al.  
- In subsection "3.1. Solar dish model" I would reflect somehow "solar receiver model", since no optical treatment of the parabolic surface is considered.  
- In subsection "3.2. TES model", page 9, it is said "The PDE system has been implemented in Python", but PDE has not been previously introduced. What does it mean?  
  
(5) Section 4. Results and discussion  
- Please, I encourage the authors to cite the source of meteorological data employed (DNI and ambient temperature), since I think it is not mentioned within the text.  
-Figure 4, page 12: Which represents the axis on the left? I suppose it is a mixture of ºC and kW, could you specify within the caption?  
-Figure 5, page 14: Which does a) and b) refer to? Please, specify within the caption that a) is Cordoba and b) Málaga to make the read easier. I would also include (briefly) the meaning of the red markers, although mentioned later within the text.  
- Page 15, line 5, right column: It is said "Córdoba and Málaga [see Figs. 6 and 7(d)]. This..." I think there is (e), since you are talking about zero-energy window, which only occurs with N=2 or more.  
-Page 15, line 26-27, right column: "In winter [Figs. 6 and 7(d)],..." I think it is also mistaken, should it be (h)?  
  
  
  
  
Reviewer #2: This paper is mainly devoted to study a thermal system combining Parabolic Dish solar collectrs (CSP) and Thermal Energy Storage (TES) technologies aimed at reducing CO2 emissions in High Temperature industrial applications. Numerical simulations and a sensitivity analysis on one or several solar dishes have been conducted to analyze the performance provided by these configurations on three representative days.  
The paper is well structured and the Title, Abstract and Highlights clearly reflect the content of the article.

The reason for choosing this configuration (Solar Dishes + TES) is closely related to the type of application, which requires high temperatures and, therefore, high concentration factors. **This should be reiterated in the introductory part of the text to clarify the scope of this work.**

The numerical model is developed through a series of energy balances concerning a possible point receiver. The lack of a "Nomenclature" section often makes reading the relations quite difficult: it would be good to introduce it. In addition, it is not clear if the effect of the uncertainties of the concentration system on the performance of the system are ignored.

Argumentar que no se ha detallado cómo se ha calculado el valor de Ib. Decir qué valor de rendimiento óptico se ha tomado.

In relations (5) and (19) the power of the solar irradiance is denoted by Ib. Generally, Ib is the "irradiation beam", i.e. the direct normal irradiation (DNI) in W/m2. In your case, however, it should also include the optical efficiency of the concentrator, the concentration factor and the area of the receiver window: all this is not very clear (often you talk of DNI only) and should be better specified. The optical efficiency of the PDC can strongly affect the energy results.

Meter valor de rendimiento óptico de Zhu y de Judit. Incluir ecuación 1, de Judit diciendo que hemos calculado Ib a través de esa relación.

Finally, the economic evaluation, which is fundamental for the sustainability of any renewable energy system, is based only on the evaluation of the natural gas saved and on the reduction of taxes for CO2 emissions. These two factors would only increase the plant's incoming cash flow. In fact, you should also take into account the investment required for the installation of a series of PDCs and for a TES. In other words, an evaluation of the LCOH (on a representative year) relative to the various configurations proposed should have been conducted, comparing it with that of a natural gas-only plant.

On the basis of these considerations, I believe that the paper needs a major revision aimed at covering the exposed gaps and uncertainties .

Lana de roca: 200 €/m^3

L = 1 m

V = pi\*L/4\*D^2 = pi/4 ó pi/4\*1.5^2 m^3  
  
  
  
**Reviewer #3: Comments to Author.**  
This paper analyzed the performance of a thermal system combing with solar dish and solid TES unit. Some term expressions are confusing, such as Ib, sometime is solar irradiance power, sometime is solar irradiance. And the nomenclatures should be described clearly in full paper.

1: what is the novelty of your paper, compared the previous work？If just a CSP and TES which are mutually technology.

2: In figure 1, what's the source of the external heater (d)? From Figure 1, maybe it is electricity comes from the grid? But it is also the heat which comes from the TES?

3: In P9L15 on the right column, Ib0 is 7kW, whether the number of dishes iis different, the data is the same? The reflecting area will increase with the number of dishes, and the I\_b will increase?

4: In P12L43 on the right column, "the efficiency of the dish undergoes a sudden drop at noon on March 22nd and June 22nd when N=4". But in figure 4, it showed the condition is N=2?

5: Figure 4 is Transient evolution of the (scaled) ambient Ta, output To and foam Tf temperatures, solar irradiance I\_b, but the solar irradiance is DNI (W/m2), not power kW. The label in Figure 4 showed the unit of I\_b is kW, wihci is related the DNI and area? But the curve of I\_b is the same when N=1, 2, 4? The curve of the I\_b should be the curve of DNI.

6: In P13L60, Although the aperture area of the solar dish has been fixed at 44 m2, the area is single dish or the total area of multiple dishes.

7: All the equations, you should give the references and the theoretical basis? Such equations 28 to 34

8: In Figure 5, what are the difference between a and b? please give the meaning of every parameter in detail.

9: In Figure 6, why Tsd is about 200℃ when there is no solar irradiance?

10: In Figure 8, what's the meaning for a~d?

11: The results in figures, the reasons should be experession in detail