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Economics of Open-Source Solar Photovoltaic Powered Cryptocurrency Mining: Open Review

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Reviewers: Reviewer A, Reviewer B

Abstract. The final version of the paper "Economics of Open-Source Solar Photovoltaic Powered Cryptocurrency Mining" can be found in Ledger Vol. 8 (2023) 1-26, DOI 10.5195/LEDGER.2023.278. There were two reviewers involved in the review process, neither of whom has requested to waive their anonymity at present, and are thus listed as Reviewers A and B. After initial review by Reviewers A and B, the submission was returned to the authors with feedback for revision (1A). The authors resubmitted their work and responded to reviewer comments (1B), at which point the resubmission was deemed sufficient to address any prior concerns, thus ending the peer review process. Author responses in 1B have been bulleted for reader clarity.

1A. Review

Reviewer A

Does this paper represent a novel contribution to cryptocurrency or blockchain scholarship?

Yes

If you answered "yes" to the previous question, in one sentence, describe in your own words the novel contribution made by this paper:

Topic is related to Economics of Open-Source Solar Photovoltaic Powered Cryptocurrency

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Mining, which is very new and unique.

Is the research framed within its scholarly context and does the paper cite appropriate prior works?

Yes

Please assess the article's level of academic rigor.

Excellent (terms are well defined, proofs/derivations are included for theoretical work, statistical tests are included for empirical studies, etc.)

Please assess the article's quality of presentation.

Excellent (the motivation for the work is clear, the prose is fluid and correct grammar is used, the main ideas are communicated concisely, and highly-technical details are relegated to appendixes).

How does the quality of this paper compare to other papers in this field?

Top 5%

Please provide your free-form review for the author in this section.

This paper is very well written and can be accepted as it is.

Reviewer B

Does this paper represent a novel contribution to cryptocurrency or blockchain scholarship?

Not sure

Is the research framed within its scholarly context and does the paper cite appropriate prior works?

Yes

Please assess the article's level of academic rigor.

Good (not excellent but a long way from poor)

Please assess the article's quality of presentation.

Good (not excellent but a long way from poor)

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How does the quality of this paper compare to other papers in this field?

Top 50%

Please provide your free-form review for the author in this section.

- Please explain "j/Gh" (Table 1): What does it stand for? Why is it an efficiency indicator? - Formula 1 is only correct, if LCOE from grid = LCOE to grid (feed in revenue equals electricity cost). This might not always apply. At least should be mentioned. - “BTC” needs to be explained

- Quality figure 2 improvable? Green, yellow and red areas need explanation.

- Table 3 would improve, if you would only display aspects that differ in the three set ups. Things that are equal can be left to the text.

- Figure 5 is dispensable. Only shows that the Antminer has a constant power uptake. Can be mentioned in the text.

- The section in 3.3 on the ROI in the different locations is quite monotonous to reed. I suggest summing it up in a table and just giving a basic overview/summary in the text.

- To my understanding the study misses a critical point: Running an Antminer requires the computer to be cooled sufficiently (see section 2 Methods page 3 last sentence). Now, for a single Antminer in a lab this canbe done using a simple fan. The electricity demand of this has been regarded in the study.

The problem increases with multiple Antminers in a container to a degree that would require a larger cooling installation, e.g. an air conditioning (AC) unit. E. g. see Sawyer, Richard. "Calculating total power requirements for data centers." White Paper, American Power Conversion 562 (2004).

The problem increases again in locations with a high solar radiation as the container itself acts as a (thermal) solar collector and the received radiation needs to be “cooled away”. E.g. see de la Flor, Francisco José Sánchez, et al. "Solar radiation calculation methodology for building exterior surfaces." Solar Energy 79.5 (2005): 513-522.

Both effects lead to a substantially higher electricity demand than the study implies, thus reducing the ROI and/or increasing the PV demand (and therefore land demand).

I suggest recalculating the model(s) after including these two effects.

- Needs revision on energetic approach of the model

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1B. Author Responses

Reviewer B

1. Please explain "j/Gh" (Table 1): What does it stand for? Why is it an efficiency indicator?

- Clarification has been added to section “2.1 Miner Set-up” when calling upon Table 1.

2. Formula 1 is only correct, if LCOE from grid = LCOE to grid (feed in revenue equals electricity cost). This might not always apply. At least should be mentioned.

- Thank you, we agree such net metering is now stipulated in “2.4.2 Solar PV System”

3. “BTC” needs to be explained

- Defined on first use

4. Quality figure 2 improvable? Green, yellow and red areas need explanation.

- Thank you for your suggestion, we explained the green, yellow, and red Fibonacci regression zones in the section “2.4.2 Bitcoin Price” in addition to the statement at the end of the legend in Figure 2. We avoided zooming into the data, however as we do not want to eliminate the historic price action.

5. Table 3 would improve, if you would only display aspects that differ in the three set ups. Things that are equal can be left to the text.

- Thank you for the suggestion, we have made this change.

6. Figure 5 is dispensable. Only shows that the Antminer has a constant power uptake. Can be mentioned in the text.

- Figure removed.

7. The section in 3.3 on the ROI in the different locations is quite monotonous to reed. I suggest summing it up in a table and just giving a basic overview/summary in the text

- Thank you, we have summarized the return-on-investment values in a new Table.

8. To my understanding the study misses a critical point: Running an Antminer requires the computer to be cooled sufficiently (see section 2 Methods page 3 last sentence). Now, for a single Antminer in a lab this can be done using a simple fan. The electricity demand of this has been regarded in the study. The problem increases with multiple Antminers in a container to a degree that would require a larger cooling installation, e.g. an air conditioning (AC) unit. E. g. see Sawyer, Richard. "Calculating total power requirements for data centers." White Paper, American Power Conversion 562 (2004). The problem increases again in locations with a high solar radiation as the container itself acts as a (thermal) solar collector and the

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- Thank you for your thoughtful insights. We have added a new section discussing this effect to the discussion. We will be factoring this into the analysis of our future in-depth thermal paper. This future paper will build upon this one and provide a more thorough analysis of the thermal dynamics beyond the technical electricity requirements identified in this foundational paper to use the waste.

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