

Interactive comment on “Energetic regimes of the global economy – past, present and future” by Andrew Jarvis and Carey King

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We thank Prof. Haff for his useful review of our manuscript. It is often easy to forget that the mainstream view of economic systems is with humans very much at the wheel, and we appreciate the reminder that others appear stuck on this. We would like to believe that, as scientists, we are agnostic on this issue, and that if a theoretically credible interpretation of relevant observations arrive at accounts where people are displaced into the passenger seat somewhat, then this is admissible evidence in what should be an open debate. It is beyond debate that the role assumed for energy efficiency improvements in the Paris process places humans in near full control of that vehicle. We believe we present credible evidence to at least question this assumption and in so doing we attempt to alert society to both its possible hubris, and the risks that stem from

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this. That said, the manuscript does not tackle the issue of agency head on and, as we have stated in the responses to both R1 and Rosen, we would be happy to engage that discussion in the revised manuscript, in all likelihood drawing on Prof. Haff's important and insightful contributions in this area. The manuscript would certainly benefit from that and better linking to the relevant rebound literature.

On Prof. Haff's specific comments:

Haff - First para: should contain a definition of aggregate energy efficiency AEE.

Response - We are happy to revisit this in the revised manuscript, although this takes some unpacking and is addressed in some detail soon afterwards (L66-83).

Haff - Line 56: Need a clear statement of what is meant by "useful" work or (line 61) "activities judged to be useful".

Response - Again, we are happy to include more text on this here, but L66-83 attempted to cover this.

We will review our introduction of 'AEE' and 'useful' and make every effort to improve the clarity of these terms.

Haff - Line 66: "The relationship . . . is not causal, but rather summarizes. . ." Might also be useful to explain that the fundamental reason it is not causal is because GWP \hat{A} is part of a feedback loop not a oneway street.

Response - We are more than happy to expand a little on this issue as it is important, but cannot promise a full account as this would require a very significant detour which is the focus of a separate paper we are currently working on. But we agree, this 'production function' is actually the feedback resolution of supply and demand boundary conditions.

Lines 79,82: provide clear definition of what is meant by "productive".

Response - We agree this could and will be clarified. Currently, by implication it is any

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structure created through useful work that leads to future flows of useful work. In this view, if a set of economic structures can create more of these structures it can be said to be productive.

Haff - Lines 96-97: not sure what “standard growth accounting” entails.

Response - As first proposed by Solow (1956; we think) where the growth rates of multiplicative production factors are additive. Again, happy to expand on this and in so doing will draw parallels between our focus on AEE and consideration of Total Factor Productivity (TFP) in economics.

Haff - Fig 1: describe what Shared Socioeconomic Pathway is, and how does SSP differ from IAM.

Response – The SSP framework is used to coordinate studies of IAMs such that results are comparable. But SSPs are also specific scenario outputs from IAMs. We present the SSP2 ensemble response of the IAMs contributing to the IPCC Model Intercomparison Project. We assumed this to be commonly understood in the energy/climate literature but we are happy to clarify this through appropriate cross referencing.

Haff - Line 443: “. . .high growth rates in AEE simply act to accelerate the system. . .”
Might a reference to Jevons (1865) be appropriate here or elsewhere in paper?

Response - Here and elsewhere we will link more to the relevant rebound literature as this may also address some of the concerns raised by R1 and Rosen.

References

Solow RM (1956) The Quarterly Journal of Economics, 70, 65–94

Interactive comment on Earth Syst. Dynam. Discuss., <https://doi.org/10.5194/esd-2020-59>, 2020.

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