Hello Editors and Reviewers!

I have read through the comments from Reviewers 1 and 2 and made revisions. My notes on changes made in response to review are in bold text. Thank you for the comments! Teaching a summer class slowed down my revision – apologies!

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> \* Separate figure files (separate from text and tables) are required for production purposes. Currently, only Fig. 4 is provided as a separate file. Submit a separate figure file for each figure cited in the manuscript, not just one file containing all figures. See [https://www.aapt.org/Publications/tpt\_figure\_guidelines.cfm](https://nam02.safelinks.protection.outlook.com/?url=https%3A%2F%2Fwww.aapt.org%2FPublications%2Ftpt_figure_guidelines.cfm&data=05%7C02%7Cnmoore%40winona.edu%7Ce4ef234bfdae480e400508dc751e22cb%7C5011c7c60ab446ab9ef4fae74a921a7f%7C0%7C0%7C638514019527163872%7CUnknown%7CTWFpbGZsb3d8eyJWIjoiMC4wLjAwMDAiLCJQIjoiV2luMzIiLCJBTiI6Ik1haWwiLCJXVCI6Mn0%3D%7C0%7C%7C%7C&sdata=BmcP%2F5B%2B39lHI7RCzwfma73u0fv%2FmEbEFIxtgKVm1xU%3D&reserved=0) for figure guidelines.

**All image files are attached**   
  
\* You cite an online appendix but then say "(attached, or could be online [https://arxiv.org/abs/2301.06637](https://nam02.safelinks.protection.outlook.com/?url=https%3A%2F%2Farxiv.org%2Fabs%2F2301.06637&data=05%7C02%7Cnmoore%40winona.edu%7Ce4ef234bfdae480e400508dc751e22cb%7C5011c7c60ab446ab9ef4fae74a921a7f%7C0%7C0%7C638514019527174539%7CUnknown%7CTWFpbGZsb3d8eyJWIjoiMC4wLjAwMDAiLCJQIjoiV2luMzIiLCJBTiI6Ik1haWwiLCJXVCI6Mn0%3D%7C0%7C%7C%7C&sdata=Z3ZwelK8gsed8SWmxubskwGk9IWrmbSPMr4YNmSTM40%3D&reserved=0))". It appears that it was included in your original submission but the file is no longer included in this submission. Please choose whether you want it to be an online appendix for this article or whether you want to cite it as an external online article.

**A reference pointing to the arxiv paper will be fine – good suggestion. Correction made.**

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Reviewer #1 (REMARKS to AUTHOR(s)):  
  
Review of “How many acres of potatoes does a society need? Using food and

historical claims in an energy context”

I have reviewed this paper and greatly enjoyed reading it. I think that it provides some good

examples of back-of-envelope type calculations on some relevant historical problems and

provides a sound pedagogical framework. I recommend that it should be published with some

fairly minor revisions.

Minor Revisions Noted:

Lines 15 and 20: Inconsistency in use “a degree Celsius” but “1 oF”

Inconsistency: space between a number and kcal – I recommend “3000 kcal” rather than

3000kcal”. **Noted and fixed.**

Line 23: use semicolon “; it will cost you…” **fixed**

Line 29: “There are a frustratingly large number of different units in play for energy”. **revised**

Line 71: For clarity “Data is given in bushels per acre (1 bushel = 56 pounds)” **a bushel is 35L and a bushel of field corn weighs about 56pounds. I added the metric volume, but I’m not sure what the most clear unit would be.**

Line 76 – I’m not sure if this paragraph is meant to be in the text or in the figure caption. I think

the text should be in the body of the paper. **Since grad school my habit has been long figure captions, after my advisor said “Nathan, nobody reads the paper – they just read the figure captions…”**

Line 158: “Few, if any, Native American cultures made use of...” – commas around the “if any” is

my preference. **I adopted your suggestion, but I’m not sure what it means. Are the quotes meant to criticize an old-fashioned Euro-centric perspective? I don’t know much native history, but I can’t think of any culture which made use of draft animals for agricultural cultivation and food transport. Dogs pulling sleds in the far north and travois in the great plains are the only examples I can think of. The Inca made wide use of llamas, but they were far south of Tenochtitlan and seem to be mainly used for fiber and meat. I read once that the plagues (flu, pox) brought by Europeans were particularly deadly because Native Americans had minimal biological history of living with agricultural animals and their associated zoonotic diseases.**

Figure 4: I find this confusing. If color is being used in figure 2, then I would suggest using it in

figure 4 to delineate the regions under discussion. I would suggest just using the inset map and

colorizing it. For international readers, it would probably be helpful to include a km scale as well

as the miles. **Thanks! I added a 10km bar and highlighting to show the chinampas area.**

Line 186 I would write out “P, the corn productivity in bushels per acre” for clarity. **I agree, added.**

Calculation on line 187 - I assume that the equation label 4 will be on the same line as the

relevant calculation when not in proof form. **I hope the same!**

Calculations starting on line 237. There needs to be consistency in the number of significant

figures used. I would suggest 2 sf. Significant figures are an important thing in calculations

such as these, where we are doing rough estimates, and students should be able to spot

unnecessary precision – a very common issue in many estimates! A short comment to this

effect somewhere in the text is recommended. **I added a comment to this effect right after the calculation. I would rather not truncate the USDA numbers.**

Line 257. A complete failure of the laissez-faire economic policy of the Whig administration

governing in London at the time. BBC - History - British History in depth: The Irish Famine (extra

reference for you) **Thanks for this reference on the political situation! I added it to the paper.**

Other Recommendations:

Fix figure 4

Add a sentence or two after line 113 making the point that these estimates assume that there is

sufficient labor to work the fields, and that you can efficiently distribute food to the population.

This is not just a logistics system, but also economics and sociological factors – can people

afford the food, or are they socially excluded from obtaining the food. **Good point - added. Thanks.**

Conclusions. I would rewrite this to be more positive about encouraging students to perform

numerical estimates when studying problems. Ditch the word “arrogant” and the phrase “these

students” **Appreciate the suggestion – modified. Thanks!**  
  
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Reviewer #2 (REMARKS to AUTHOR(s)):  
  
This paper makes a number of very useful points for teaching introductory physics, but I think that the introduction needs significant improvement. Minor quibble on line 48-51: the author discusses three examples. **Thanks, corrected**  
  
The introduction focuses on the bewildering multiplicity of energy units, before changing focus to food energy. Many readers might lose interest before getting to the interesting examples. I suggest focusing the introduction on food and energy, leaving most of the discussion of energy units and the "Science and Social Policy" course to the end of the paper. Alternatively, starting with an abstract like the one in the linked arxiv article would also orient the reader well. **I revised the introduction and moved the class context to the end. I think this does get the reader to the interesting part of the paper faster. Thanks for the suggestion.**  
  
The example of growing your own food is fascinating to me, as it includes a lot of non-physics considerations. I particularly liked the discussion of whether New Jersey could grow enough potatoes to feed itself (spoiler alert: it can't using traditional methods). I also really appreciated the discussion of organic agriculture. **Agreed! Dr. Sarah Taber’s commentary on this subject has been very informative for me.**  
  
The Tenochtitlan population estimate is also interesting. It would help to add a sentence or two about the use of ImageJ (whatever that is) for estimating the crop area of the city. **Done.** It would also be useful to point out the uncertainties of the technique as applied to population estimation (i.e., while the central estimate is about 100,000 people, what are the reasonable limits on the estimate). **I haven’t seen uncertainties attached to the population estimates I referenced, but I agree the wide variation is something to wonder about. It would certainly be interesting (as a student exercise?) to propagate uncertainties through the estimate in equation 4. I assed a comment along those lines in the paragraph following equation 5.**  
  
The Irish discussion is also useful. I do not see any evidence in Fig 5 for a famine in 1740. Wikipedia mentions food shortages in other years. **Appreciate this observation. I revised that paragraph.**  
  
However, I would remove the emotional content of the conclusions in lines 255-257. While the numbers suggest that Ireland grew enough oats to feed itself if the potato harvest failed, the political and economic situation was far more complicated than would be appropriate to discuss here. **Yes, I agree that the political situation was complicated. I softened the language. BBC Reference on the Irish Famine (and related political situation) added.**   
  
I assume that the class covers more than just food energy. I would like to see a paragraph or two at the end on the other topics covered in the class. **I added a section to the end, per your earlier suggestion, and made clear references to the textbooks we’ve used for the class in the past.**  
  
Overall, I think that this article discusses an often-overlooked but critically important aspect of energy use. It carries thru straight-forward calculations to reach interesting conclusions.  
  
It should be published after some minor revision.

**Again, thanks for the comments!**