Review General Response

We would like to again thank the reviewers for their detailed assessment of this paper.

Reviewer 1

1. General. This paper applies the well-known fuel cycle simulator Cyclus to analyze the DOE nuclear fuel cycle options. Cyclus is widely recognized as a flexible, fuel cycle analysis computational tool designed for problems such as this. The literature review is satisfactory for the scope of the work. Thank you for including line numbers. Its surprising how many manuscripts do not include them especially since inclusion is not particularly labor intensive. This is a minor criticism, but this reads like a thesis/report. A journal paper is a little more streamlined and focused since the authors do not have to prepare a defense for their work.

   Solution: Thank you for your kind review. I have streamlined the paper to make it more focused to read less like a thesis/report. See the responses below for more detail..

2. Section 3. This section turned into largely an information dump. Again, possibly due to the report v journal paper issue. There is a lack of the so what that is needed for journal papers. Its not easy, especially with so many figures. There is a lot of performs best being thrown around, but not really what that means. I dont know if it would be better to segregate the results into further subsections, but the impact of the work risks being lost. Dont assume the reader is going to understand the implications just because

   Solution:

3. Figures. This might be a bit picky, but is there a way to line the figures up more with the text? For instance, Figures 7,8,9 are referenced on p21, but you have to scroll down several pages to see them. As someone who includes lots of graphs in their research too, this is understandably a challenge.

   Solution:

4. Conclusion. This section is rather glib, given what seems like a quite a body of work that was produced. I would recommend to include major findings and implications clearly.

   Solution:

5. Future work. Similarly, after all this work, only a sensitivity analysis is suggested. Is there anything more? What is envisioned the long term use of d3ploy?

Solution:

6. Acknowledgments. I dont know if its necessary to include author contributions. Given that Prof. Huff is the author of record; i.e., listed last, it is known she directed the work, and given her reputation, there is no doubt anyone listed as an author contributed meaningfully to the work. Ive never really seen that in journal papers anyway, but authors discretion.

Solution:

7. Line Items (Abstract)

   1) Abstract - Not everyone is going to know what d3ploy is. Either elaborate (a short sentence) or remove it and just explain it later on in the paper.
   2) Abstract - The claim of more efficient should be supported by a clearer context; i.e., efficient in what way?

Solution: The abstract has been modified to read:
The demand-driven deployment capabilities are refered to as `d3ploy`. We demonstrate `d3ploy`'s capability to predict future commodities' supply and demand, and automatically deploy fuel cycle facilities to meet the predicted demand in four transition scenarios. Using `d3ploy` to set up transition scenarios saves the user simulation set-up time compared to previous efforts that required a user to manually calculate and use trial and error to set up the deployment scheme for the supporting fuel cycle facilities.

8. Line Items (Non-quick fixes) 3) 3-30 - While there are certainly many people familiar with the capabilities of Cyclus, there may be some who are not. It might be instructive for some more description of it, either here or in a separate section. Only a paragraph or two, maximum. Some newer readers might not know what agent-based means.

9. Line Items (Non-quick fixes) 5) 3-58 - Ref. 7 is now 6 years old. Are these fuel cycle options still considered DOE policy? In and of themselves, these are acceptable options for study with Cyclus, but it still begs the comment as to its status.

10. Line Items (Non-quick fixes) 6) 4-63 - What does performance mean in this context?

11. Line Items (Non-quick fixes)

Solution:

Reviewer 2

1. Comments on Content. You make no mention of the impact of the issue of dynamic fuel compositions. The commodity that the reactors are demanding and the one being supplied by the reprocessing plants is constantly in flux during a transition scenario with unlimited recycle. Other applications that use forecasting methods don't have this concern. So effectively what you need to predict isn't just the capacities needed based on the mass of SNF, but also its post-reprocessing worth. When using reprocessed fuel, the necessary fissile loading fraction of MOX or TRU in a fast reactor may be as much as 50% higher for material sourced from a MOX LWR than from a UOX LWR. This difference will significantly impact your reprocessing capacity required to supply that material.

   Solution: Thank you for your kind review. The statement concerning 'unmatched' fidelity has been removed entirely and the bibliography has been expanded significantly. See the responses below for more detail..

2. Pg 2. Fuel cycle options doesn't need to be capitalized.
   Pg 3. Greenhouse is one word and greenhouse gas doesn't need to be capitalized.
   Pg 3. Line 50-52. This sentence is hard to follow with nested lists and clunky grammar.
   Pg 3. Line 59 Evaluation groups doesn't need to be capitalized.
   Pg 9. This section might be easier to follow if it was an enumerated list rather than forcing a paragraph structure.
   Pg 9. You use the acronym LWR but don't define it until page 11.
   Pg 10. Please use the same indentation for both equations 4 and 5.
   Pg 12. Numbers on axes for figure 3 are small.
   Pg 13. The definition of terms in an equation shouldn't have its own equation number. Equation 7 should be a list or part of equation 6. Also, please match indentation.
   Pg 15. Please fix indentation after equation 9.
   Pg 15. The sentence after an equation does not always start a new paragraph, so it shouldn't be indented if it doesn't.
   Pg 16. Equation 12 should be a list or part of equation 11.
   Pg 16. You do not define what the "L" term is in equation 13.
   Pg 17. You do not define what the "d" or "Y" terms are in equation 14.
   Pg 18. Rather than starting the results section with a sentence 7 lines long, it would improve readability to make it into an enumerated list.
   Pg 19. You don't need to state in the caption to figure 5 that power undersupply is avoided. You state that in the preceding paragraph Pg 23. The labels and axes are too small in figure 8. You also don't need to state results in your caption that are already stated in the main text.
   Pg 24. The labels and axes are too small in figure 9. You also don't need to state results in your caption that are already stated in the main text.

   Solution: All these comments have been addressed and fixed.

3. Pg 5. It is unclear if d3ploy runs before the simulation or if it is doing these calculation on-the-fly. If you are only predicting the necessary capacity a single time-step in advance does that mean that there is no deployment or process times?

References