Dear Dr. Bart van Arem,

My Colleages and I are grateful for the opportunity to revise our paper. The reviewers have provided excellent feedback which we have incorporated to improve the quality of the manuscript. Our response to each reviewer comment appears below. The reviewer comments are given in the red format and our responses are in blue.

Reviewer 2

The comments for reviewer 1 are addressed here:

1. **Reviewer:** The paper has been improved and the proposed modeling for the optimization problem is interesting. However, one of the key outstanding issue is that the authors spent no effort to cite/survey and critic several recent papers published in top-tier journals and addressing the same problem. Minimization of the cost of charging "charging problem" with consideration of different rates of electricity prices such as time of use is not novel. By searching in the IEEE Xplore database with quote "Electric Bus fleets", there are several journal papers published in the area. Examples are:

   - DOI: 10.1109/JSYST.2021.3114271
   - DOI: 10.1109/JSYST.2019.2926460
   - DOI: 10.1109/ACCESS.2020.2964391

   Response: Thank you for the feedback. We have updated our literature review to include the recommended papers.

2. **Reviewer:** Each bus or group of buses have their own designated platform in a bus terminal. As such, it is very unlikely to assign buses for different chargers i.e., each bus will be assigned to a charger located in its platform. Hence, having the probability/possibility of two buses (bus 1 and bus 2) to be connected to the same charger at time t is not applicable. usually, bus 1 and 2 will have different platforms and thus different chargers.

   Response: There are certainly scenarios where each bus would have a separate platform. Our work was focused around what we observed at the Utah Transit Authority in Salt Lake City, where the station maintains two overhead fast chargers to be shared among buses during the day. We also anticipate that transit authorities will desire to save money by only installing the minimum number of chargers, which would lead to contention and a tendency to overbook. Our work focuses on the more general case, knowing that under different assumptions, the proposed method could be simplified.

3. **Reviewer:** Time steps will not be uniform in a bus fleet a they vary based on the arrival time(s) of buses, which also varies over the daytime.

   Response: We understand this comment to be asking why the proposed method doesn't align the time steps in the graph with the arrival and departure times of the buses. One contribution in the proposed work minimizes the cost of demand charge which is billed for the highest fifteen minute average power from both the uncontrolled loads and bus chargers. We use an evenly spaced sampling approach to establish a common temporal frame of reference so that the effects of power use from the uncontrolled loads can be combined with those of the electric chargers.

4. **Reviewer:** Order of referencing within the text is not clear. It has to start from [1]....

   Response: Good catch! I have updated the references so that they are numbered by appearance.

5. **Reviewer:** It is very strange talking about Fig. 5 before Fig. 4 in the text.

   Response: We have updated the figures so that their numbers better follow their appearances.

6. **Reviewer:** In the reviewer's opinion, the authors complicated an optimization problem that could be easily formulated and solved via its reformulation as a graph. The main issue with such graph-based formulations is the scalability and computation complexity. The authors are advised to compare the proposed formulation with a regular optimization formulation under different sizes of bus fleets. There is little to no description about the superiority of the proposed graph-based technique in the results section.

   Response: We understand the reviewer's comments to mean that because the proposed method was made more complicated when it was reformulated as a graph, it may not scale well, making it less effective than alternative solutions. One contribution our method offers is the ability to account for the effects of uncontrolled loads on price. The uncontrolled loads are computed from historical data, which is by nature, discrete. Before the effects of external loads and bus charging could be integrated into a single framework, they had to be brought into temporal correspondance, which was accomplished using a graph. Prior methods did not account for the uncontrolled loads in their solutions and as such, did not need to descritize their temporal components. This solution may be more complicated than other methods, but this is because the proposed method is more complete. We have shown that including the additional information in our method results in significant savings (see Fig. 17) and outperforms both a baseline and previous optimization technique. We have included an additional plot which shows how the number of constraints and variables increase with the number of buses so that the reader may be aware of computational limitations.

Review 3

The comments for reviewer 3 are addressed here:

1. **Reviewer:** What is the benefit of using a graph-based network flow framework to present the BEB charging optimization problem instead of an equation-based MILP mathematical formulation (considering the charging variable as a decision)? Many similar published studies take the other approach, such as (https://doi.org/10.1016/j.tre.2020.102056 and https://doi.org/10.1016/j.trd.2021.103009).

   Response: One contribution our method offers is the ability to account for the effects of uncontrolled loads on price. The uncontrolled loads are computed from historical data, which is by nature, discrete. Before the effects of external loads and bus charging could be integrated into a single framework, they had to be brought into temporal correspondance, which was accomplished using a graph.

2. **Reviewer:** Many other similar works related to BEB charging optimization are published in energy and transportation journals (e.g., Transportation Research Journals group). A comparison between the proposed and previous models is essential to highlight the paper's contributions (better in a table). Including charge demand, electricity ToU tariff, and day/night charging are not new.

   Response: The reviewer is correct when they say that minimizing with respect to charge demand, time of use and day/night constraints is not new. It was our intent to create a framework that was more complete by including as many aspects of charge cost as possible. Our work does however contribute a framework that accounts for uncontrolled loads and examines the effects of variable rate charging. The reviewer is also correct in saying that a comparison between the proposed technique and prior work is needed to highlight this work's contributions. The results section features several comparisons which do just that.

3. **Reviewer:** It is essential to illustrate the model assumptions (charging stations allocation, chargers' power, battery capacity, transit network) at the beginning of the model presentation (summarized). In addition, it will be better to include a table for the value of all parameters.

   Response: We did give the model assumptions in the beginning of the results section (the battery capacity is in Section A paragraph 6).

4. **Reviewer:** There is a constraint for the state of charge (SoC) to be greater than a lower threshold. Is there a constraint for SoC to be less than a maximum threshold?

   Response: Because we are using a CCCV model for the battery, the difference in state of charge decreases as the state of charge approaches its maximum.

5. **Reviewer:** In the literature, high-power chargers (fast chargers) are deployed to charge the BEBs during operation. Will the results change if these chargers are used?

   Response: It's possible that the results could change (in that perhaps there would be non-maximum optimal charge rates). I wouldn't anticipate anything else change all that much...

6. **Reviewer:** The number of variables, constraints and the computing time of the solved models should be presented in the paper to describe the complexity of the proposed model. In addition, the transit network data and the charging system infrastructure configuration must be included.

   Response: We can add a plot/table that gives the number of variables to help the reader understand the comlexity of the model. As for the transit network data and charging system infrastructure configuration... Would it be sufficient for use to say that the algorithm doesn't take these into account and so we haven't simulated this? Would it also be a good idea to talk about how we rely on Rocky Mountain Power to create tarrifs so that minimizing the tarrifs would resolve these sorts of issues? It seems like this all comes back to minimizig the demand charge (as each meter is given for each circuit)

7. **Reviewer:** In the text, Fig 5 before Fig 4 and Fig 13 before Fig 12.

   Response: We have updated the figure references to reflect their use.

8. **Reviewer:** Equation 10 is equality or inequality?? The summation in Equation 39 is on buses or timeslots?

   Response: Good catch, it was inequality. We have updated equation 10. The summation in equation 39 was for all buses in a given timeslot. We have updated the wording to make this more clear.

9. **Reviewer:** In equation 11, the energy consumption δ_i is only related to the bus ID. How is it calculated in the proposed model (what is the value)?

   Response: The model itself does not compute δ_i. We assume this as given (perhaps computed from historical data).