Reviewers' comments:

Reviewer #1: This is an interesting piece of work. The authors consider both short-term operation optimization and long-term investment optimization problem into one big problem, taking into account uncertainties in both sub-problems. The authors apply a novel two-step approach to solve the problem, while keeping the problem tractable. There are some questions which need to be addressed first.

1.      The primary question is about the functional form of micro-grid's cost (Eq. (12)). According to the authors, a short-term optimization is performed for realized trajectories of spot price, demand, solar and wind supplies, together with natural gas price (and thus peak preset electricity price). The natural gas price is a result of Monte Carlo simulation in the second step. The other trajectories are based on the distribution estimated from historic data. The authors conduct design of experiments, and fit the optimal micro-grid costs and the corresponding grid characteristics (all the I's) to the quadratic functional form. I am not completely convinced that quadratic functional form be a good generalization for the relationship between optimal cost and micro-grid setting. It may be necessary to show a bit more details about the process. For example, how many experiments are conducted (or equivalently, how many sample points are used to fit the curve)? How good is the

regression? How much will the uncertainty in the coefficients of Eq. (12) affect the result of investment optimization?

2.      The authors assume that the peak day-ahead price is driven by natural gas price. Also, it seems a fixed Time-of-Use price with proportional demand adjustment penalty is used. These are reasonable assumptions, but some explanations or references would be necessary.

3.      Please explain what weights (gamma's) are used in Eq. (11), and why?

4.      The authors also make assumptions regarding constant asset efficiency, battery charging/discharging rate, zero operational costs for WT and PV, etc. They are reasonable assumption, too. But, it may be necessary to show that, under normal operation condition, they are approximately valid.

5.      Following Question 4, WT and PV output have lower and upper bounds. Why they are not considered as constraints?

6.      According to Figures 8, 13 and 15, for some years, the optimal solution would simultaneously recommend borrowing fund and making alternative investment. Intuitively, if FC is greater than ROI (which is the case, according to Table 2), such two actions should not be recommended for the same period of time. Please explain your results.

7.      Any references for the data in Table 1 and Figure 6, as well as other assets, micro-grid parameters?

8.      Is there any particular reason for choosing 4-year planning horizon? This becomes question because, unlike gas turbines, installation of wind turbines and PV panels may require long time. One year lag of service behind investment seems a little stretched, and so is the 4-year horizon.

9.      In Lines 489-490, the authors explain why WT investment dominates the optimal plan by stating WT has more contribution to micro-grid's saving. I do not completely understand - is it based on the results of the short-term optimization? The result seems counterintuitive, because WT investment cost is much higher than GF (Figure 6).

Some editing errors:

Line 182: "Eq. (11)" might be "Eq. (10)", please double check

Line 183: "Eq. (12)" might be "Eq. (11)", please double check

Line 212: "t=1, ...,  ." the Greek character of "tau" does not show correctly (at least on my computer), please double check

Line 250: "ggridmax" might be "gridmax"

A few recommendations:

I highly recommend the authors re-create some of the bar plots (Figures 8 and 12, in particular). It looks to me that the over-sized legends have squeezed the chart area. Plus the color/pattern of the bars are difficult to recognize. I also recommend all bar plots and curve plots (Figures 3, 10, 11, etc.) use the same style.

Reviewer #2: This paper investigates an optimized investment model for micro-grid power generation portfolio under uncertainty. The topic is related but the main issue is lack of a sufficient and recent literature review to support the authors claims of novelty. Specifically, what is the new of this paper compared to what the authors previously published and not cited in this paper, examples:

Farnaz Farzan and Mohsen A Jafari, MICRO-GRID PORTFOLIO OPTIMIZATION UNDER UNCERTAINTY

<https://www.researchgate.net/profile/Mohsen_Jafari4/publication/270287062_MICRO-GRID_PORTFOLIO_OPTIMIZATION_UNDER_UNCERTAINTY/links/54afe5a50cf28ebe92de2d0b.pdf>

Farzan, F., Mahani, K., Gharieh, K., & Jafari, M. A. (2015). Microgrid investment under uncertainty: a real option approach using closed form contingent analysis. Annals of Operations Research, 235(1), 259-276.

Also, more recent references should be listed in the literature and compared to the authors contribution, examples:

Khodaei, Amin, Shay Bahramirad, and Mohammad Shahidehpour. "Microgrid planning under uncertainty." Power Systems, IEEE Transactions on 30.5 (2015): 2417-2425.

Aien, Morteza, Ali Hajebrahimi, and Mahmud Fotuhi-Firuzabad. "A comprehensive review on uncertainty modeling techniques in power system studies." Renewable and Sustainable Energy Reviews 57 (2016): 1077-1089.

Gamarra, Carlos, and Josep M. Guerrero. "Computational optimization techniques applied to microgrids planning: a review." Renewable and Sustainable Energy Reviews 48 (2015): 413-424.