EE/CprE/SE 491 REPORT 14

10/28/23 - 11/11/23

Group number: **16**

Project title: **Photovoltaic Feasibility in Puerto Rico**

Client &/Advisor: **Prof. Vikram Dalal**

Team Members/Role: **Isaac Buettner, Adam Curtis, Hannah Nelson, Manuel Perez-Colon, Larry Trinh**

- **Weekly Summary**

  We have been working on finalizing all the technical details of our project, including the battery and XENDEE report, specifically the levelized cost of energy for our system. We have been having weekly meetings with our advisor, rather than biweekly so we can continue to ask questions and receive feedback. Additionally, we have been making significant updates to the design document, making our final presentation powerpoint, and also created an infographic with the main highlights of our project.

- **Past week accomplishments**
  - **Isaac**: A lot of this week has been looking at different battery options and how that impacts our project from performance to economic viability. I have been running analyses on Xendee with new battery options at a much cheaper price point, however, we are faced with limitations such as how we find the space for these batteries. For now, I'm just looking into the viability, this new option has reduced our project costs at one site drastically, by over $400k in some cases. With this in mind, I have also been using energy as a service (EAAS) as a factor in analysis now to define where funding for this project comes from, and we are also worried about how much we should sell energy for now. We are getting a wide range of results but it seems like in every case we would be able to sell electricity for $0.15/kWh or less, for reference the current price is around $0.21/kWh-$0.22/kWh. We are definitely making headway, I need to get sensitivity analyses done and look further into spacing constraints on sites when simulating and other factors.
  - **Adam:** Collaborated with Hannah to research other battery options due to advisor feedback. We are looking for a less expensive option that can still fit our demand needs. In addition to this research, I have spent a good portion of my time updating our design document to better reflect our project and clearly explain what our design is.
  - **Hannah:** Unfortunately, I had to backtrack on my battery work, as our advisor recommended finding a cheaper option. We have contacted a few companies for quotes

and detailed data sheets, but are waiting to hear back. However, it should not take long to update the XENDEE simulation with an updated battery. I also ran some calculations using the budget to calculate what percent of Puerto Rico's generation that could theoretically be offset by these systems. In addition, I have been spending a lot of time on documentation. I have been updating and adding new information to the design document; all that we have accomplished this semester. I also created an infographic that highlights the most important aspects of our project.

	Manual Calc.	XENDEE
Cost	$419,481.50	$1,487,048.90
Power (W)	158,760.00	158,760.00
Power (kWh)	479,677.46	479,677.46
Government Allocation	$1,300,000,000.00	$1,300,000,000.00
# Locations Possible	3099.063963	874.2146946
-- Rounded Locations	3099	874
Total Power (kWh)	1,486,520,460.94	419,238,103.54
Total Cost	$1,299,973,168.50	$1,299,680,738.60
Percent of Demand	8.26%	2.33%

The system cost (top row) is subject to change as we find a different battery alternative. Same with the XENDEE report.

- **Manuel:** Communicated with Burns and McDonnel contact for verification on our pricing compared to industry standard. Received confirmation that it was received, still awaiting response.
- **Larry:** I have been working on researching the backup battery for the design. After getting the suggestion from Professor Dalal, I did some research to find the model for the battery. I have contacted the Power Sonic Corporation to ask the prices for the model ES-100320- NA which I think will be a good fit for our project, and am still waiting on their answer. At the same time I am working on the design document to finish up the project.

- **Individual contributions**

Name	**Individual Contributions** *(Quick list of contributions. This should be short.)*	**Hours for (2) weeks**	**Hours cumulative**
Adam Curtis		12	108
Hannah Nelson	Research, calculations, documentation/communication	16	110
Isaac Buettner	Power analyses, one line diagrams, multi-nodal setup for 100 homes, new battery simulations	11	87
Larry Trinh	Research, documentation	8	86
Manuel Perez			78

- **Plans for the upcoming week**

  - **Isaac:** Keep looking at alternative batteries, ideally something more utility grade so it fits better at the site without being too expensive. Run some sensitivity analyses to see how our site performs under different load conditions.
  - **Adam:** Collaborate with Hannah on the battery decision and present the different options to our advisor in our weekly meeting. I will also continue to work on the design document to make sure everything is well documented and improve on/prepare for our final presentation.
  - **Hannah:** Need to finalize the cost of the battery and help with other cost calculations. Will have to make a decision, even if we don't hear back from the companies we contacted. Then, I can update the schematic. I will continue to complete the design document and work on the final presentation.
  - **Manuel:** Continue communicating with Burns & McDonnell. Help other team members with their task.
  - **Larry:** I will continue to work on researching the battery to finish up the cost and model for the battery. At the same time I will be working on the design document and final presentation.