EE 492 Bi-WEEKLY REPORT 04

2/25/24 – 3/30/24

Group number: *sdmay24-30*

Project title: *New Nuclear*

Client &/Advisor: *Dr. McCalley*

Team Members/Role: *Dana Boor (Team Lead), Damien Henry (Team Organizer), Zachary Hainline (Research and Design), Jeremy Yost (Research and Design), Mason Richards (Research and Design), Muhammad Syukri Bin Ahmad Zainal Akmar (Research and Design).*

- **Bi-Weekly summary:**

In the past two weeks, our group participated in a peer review exercise during class where we were able to receive valuable feedback from another group with a power related project. Our group has decided to divide our efforts into two main tasks as we approach the final stages of the project. Half of the group is currently focusing on the Cost-Benefit calculator, ensuring that our calculations are accurate, and that the data is presentable. The other half of the group is focusing on the CEP software simulation, where we want to run all the new nuclear technologies against each other to see which technology is deemed "more investable." We are also working on running our new nuclear technology alongside solar and wind and against the non-renewable technologies to see which the software chooses to invest more into.

- **Past weeks accomplishments:**

-Our team has compiled a summary table of our six reactor designs that each of the members has been focusing on. This table lists the key features that make these potential designs appealing and advantageous.

-Delivered a reactor research summary presentation to our advisor and received feedback on how to best present this information in our end-of-semester deliverables.

-We have created our Benefit to Cost calculator which is able to evaluate all our six reactor designs. This was created using Excel and will be used along with the CEP software. Several inputs are needed for the calculation such as MW capacity and overnight cost of the reactor.

-Our team managed to run the CEP software simulation successfully, however we need to improvise and modify the running simulation to suit our target result.

- ○ **Pending issues**

-Verifying with our advisor/client our Benefit to Cost calculator that we created and modified. Ensuring that we didn't miss any crucial details before implanting into the CEP software.

-Regarding the CEP software, since it will take a long time to run the simulation, our team decided to revise it with Ali, the person who created the software before rerunning the simulation and to help us create the results that we need.

- ○ **Individual contributions**

Name	Individual Contributions	Hours this week	Hours Cumulative
Dana Boor	-Worked on setting up team members' personal computers to be able to run the CEP software. -Discussed with team and our advisor the components that need to be in our benefit-to-cost calculation and helped research the O&M costs for reactor plants. -Met with Prof. Ali to troubleshoot and repair the CEP software.	12	34
Jeremy Yost	-Alongside Dana and Mason, I worked to understand the CEP software produced by Professor Ali. Both in scheduled meeting times and in my own free time I work to get the CEP software to give us viable information based on the information we have researched about each reactor. The program is difficult to use so along with other group members I attended troubleshoot meetings with Professor Ali so we could explain our desires from his extensive program and obtain his help in fixing our mistakes and leading us in the proper direction.	12	32

Mason Richards	-Met with Prof. Ali to help troubleshoot our issues with the CEP software. -Worked with the CEP software to try and run some of the simulations. -Participated in the discussion during the team meeting regarding both the cost-benefit calculator and the CEP software.	6	20
Syukri Zainal	-Help with setting up the CEP software. -Discussed with the team and the advisor to verify the created benefit-to-cost calculator.	10	30
Zach Hainline	-Working with Syukri and Damien developed a Benefit to Cost Calculation calculator. -Discussed and participated in teams discussion regarding the CEP software and Benefit to Cost calculator. Verifyed that the Benefit to Cost calculator looked accurate and valid	10	30
Damien Henry	- Worked with Syurki and Zach to develop the final benefit to cost calculator. Researched the values of the metrics needed to calculate. Discussed with the team and Dr. McCalley the CEP developments and future plans.	10	30

- o **Plans for the upcoming week**

The half of the team working on the benefit to cost calculator will work on the calculator to implement the feedback received from Dr. McCalley. Most importantly, they will take a more in depth look at the real-time values of metrics such as fuel costs and sale of energy to more accurately depict today's conditions. After completing this, they will then perform the calculations for each of the six reactors to see which is most economically feasible.

The other half of the team will continue working on the CEP software to refine results to suit our projects and desired outcomes. They will implement the feedback received from Dr. McCalley to ensure that the calculator is producing the results we want. Namely, they will run it once with all six reactors to determine which is the most economically feasible (and compare with the benefit to cost results), and once with wind and solar to determine if new nuclear is a good investment.

- o **Summary of weekly advisor meeting**

- Discussed with our advisor our plan for the remaining weeks left.

- Considered advisor's feedback and addressed concerns.

- Demonstrated our current results with the Co-optimized Expansion Planning (CEP) software and Benefit to Cost calculation and discussed the issues we are still facing with these items.

- Developed a plan of attack in resolving these issues.

- We talked with our advisor on how to best use the Co-optimized Expansion Planning (CEP) software to demonstrate the points we are trying to get across.

- Further discussed the numbers we are using for the Benefit to Cost calculation. We made sure that they all made sense and were valid.

- o **Team Peer Review Results**
- - Summarize the feedback you received (both written and verbal).

Team 18 offered positive and constructive feedback on our project. Some of the positive elements that were noted include our process for narrowing down suggested recommended reactor designs, our plan for the evaluation of the benefit-to-cost ratio of each design, the level of detail on our research different reactor designs, and our use of Co-optimized Expansion Planning (CEP) software for our design evaluation.

Some constructive comments made about our project were regarding how we can avoid conflicts with the compatibility of reactor components, how to best make informed assumptions when reporting economic and financial data for each reactor plant, ensuring our team clearly communicates the difference between construction time and plant operational dates, and utilizing our team's advisor more for overcoming difficulties with the CEP software.

- <u>Describe any new insights your team generated based on this feedback.</u>

This feedback affirmed to our team that our process for selecting a recommended reactor design was efficient and effective. We feel more confident in our use of the benefit-to-cost ratio analysis method and our reactor comparison data table. Our team has agreed that more time needed to be allocated towards finalizing our benefit-to-cost calculator (built in excel) and our CEP software results.

- <u>What steps are you taking based on the feedback?</u>

We are keeping all the feedback in mind when we are strategizing for our next steps of the projects. However, the feedback that is particularly relevant to the aspect of the project we are currently focusing on is using our team advisor more when we run into difficulties. Since in this stage we are primarily making sure that we get useful and informative data from software sources such as CEP and our benefit-to-cost calculator we have been running into issues involving difficulties with the software and correct input data. We have been scheduling brief meetings with Professor Ali to guide us through any difficulties we have encountered or are likely to encounter in CEP. The software takes a while to run so having these consistent meetings saves us a lot of time.